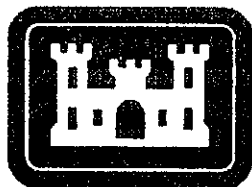

RECONNAISSANCE REPORT
TRUMBULL AND BRIDGEPORT, CONNECTICUT
PEQUONNOCK RIVER

REVIEW REPORT OF ALTERNATIVES FOR TRUMBULL LAKE

AUGUST 1985



**US Army Corps
of Engineers**
New England Division

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1. BACKGROUND

The heavily developed communities of Trumbull and Bridgeport, Connecticut have had a history of flooding from the Pequonnock River, the largest of which occurred in October 1955. Following this event, studies of flooding conditions along the Pequonnock River were initiated by the Corps of Engineers which determined the feasibility of constructing a multipurpose reservoir about one mile upstream of Daniels Farm Road Bridge in Trumbull (see Enclosure 1). This project, referred to as Trumbull Lake, was designed to control runoff from about 50 percent of the Pequonnock River watershed and provide a high degree of protection to flood prone areas in Trumbull and Bridgeport. Trumbull Lake was also designed to provide storage for water supply, water quality and recreation.

The Trumbull Lake Project was authorized by the Flood Control Act of 1966. Advanced engineering and design was conducted during 1967 and 1968. Funds to initiate construction were allotted in 1971. However, in the process of obtaining formal assurances, the State of Connecticut withdrew its support for the project due to unacceptable aesthetic, environmental, economic and social impacts. Upon notification of the State's position, all activity ceased and the project was placed in the "inactive" category on 24 April 1973.

As a result of severe flooding along the Pequonnock River during January 1978, April 1980 and June 1982, the State of Connecticut indicated it would support the Trumbull Lake Project if it continued to be economically sound and requested its reactivation on 7 October 1982. Restudy of the Trumbull Lake Project determined that it is not economically justified under existing conditions as shown below.

TRUMBULL LAKE PROJECT

(December 1982 Price Level, 7-7/8 Percent Interest Rate)

<u>PURPOSE</u>	<u>ALLOCATED FIRST COST</u>	<u>ANNUAL COST</u>	<u>ANNUAL BENEFITS</u>	<u>BENEFIT-TO-COST RATIO</u>
Flood Control	\$ 6,429,000	\$ 654,000	\$ 213,000	0.33 to 1
Water Supply	15,700,000	1,559,000	1,232,000	0.80 to 1
Recreation	1,996,000	211,000	175,000	0.83 to 1
TOTAL PROJECT	<u>\$24,125,000</u>	<u>\$2,424,000</u>	<u>\$1,620,000</u>	0.67 to 1

When notified that the Trumbull Lake Project was no longer justified, State and local officials requested the Corps to investigate other flood damage reduction measures. This report presents the results of our investigation of alternatives to the authorized, but never constructed, Trumbull Lake Project.

Studies of flooding conditions along the Pequonnock River in Trumbull and Bridgeport have also been conducted by the U.S. Department of Agriculture, Soil Conservation Service (SCS). Their report entitled "Preapplication Report for Pequonnock River" was completed in July 1982. The SCS investigated a variety of structural and nonstructural measures to reduce flood losses along the Pequonnock River, including the construction of a single-purpose flood control reservoir at the Trumbull Lake site, but found that all measures lacked economic justification. The SCS recommended that several bridge openings along the Pequonnock River be enlarged to reduce backwater flooding and that a flood forecasting system be installed to give residents advanced warning of impending floods.

2. AUTHORITY

This investigation was directed by the House and Senate Appropriations Committees in the Fiscal Year 1984 Supplemental Appropriations Act of November 15, 1983, which states, "Within available funds the Corps of Engineers is directed to initiate studies of alternatives to the authorized Trumbull Lake Project in Fairfield County, Connecticut, including a review of problems and opportunities and formulation and evaluation of flood damage reduction plans. The Corps should also consider other values which may be achieved under alternative plans and consult with local governmental officials in the formulation of the alternatives."

3. STUDY AREA

The Pequonnock River is a small coastal stream located in Fairfield County in southwestern Connecticut. The Pequonnock River is formed by the East and West Branches which originate in the town of Monroe, Connecticut and join just north of the Monroe-Trumbull town line. From there, the Pequonnock River flows south through Trumbull and Bridgeport to Bridgeport Harbor. Throughout its 9.6-mile length to tidewater, the main stem of the Pequonnock River falls about 300 feet in a series of relatively flat reaches connected by steep, rocky rapids and falls. The Pequonnock River Basin, shown on Enclosure 1, has a total drainage area of 28.3 square miles.

The study area encompasses the entire Pequonnock River Basin. However, particular attention was directed towards the investigation of four flood prone areas along the Pequonnock River which have experienced recent flood losses. These areas are located in Trumbull and Bridgeport, as shown on Enclosure 1.

4. FLOOD HISTORY AND ANALYSIS

The U.S. Geological Survey has maintained a peak discharge gage on the Pequonnock River at Daniels Farm Road Bridge in Trumbull since 1962, except for the year 1972. The Pequonnock River has a drainage area of 15.6 square miles at the gage. The following peak flows were recorded at the Daniels Farm Road gage.

DATE OF HIGH FLOWSPEAK DISCHARGES
(cubic feet per second (cfs))

April 1980	2,100
January 1978	1,900
June 1982	1,850
June 1973	1,200
April 1983	1,180

It should be noted that the experienced flooding in 1982 was believed greater than that indicative of the recorded flow at Trumbull. Higher flood stages during this event may be attributed to debris build-up in the channel.

Prior to the installation of the gage at Daniels Farm Road, a major flood occurred along the Pequonnock River in October 1955. Peak discharges during this event were estimated at 4,500 cfs.

Peak discharges at Boston Avenue in Bridgeport were estimated using the recorded data in Trumbull and transferring it downstream by ratio of drainage areas. Peak discharge frequencies were computed using the 20 years of recorded data and the estimated peak discharge of the October 1955 historic event. The resulting discharge frequencies are similar to those developed by the Corps in the 1960's as well as those developed for use in the Trumbull and Bridgeport flood insurance studies which were completed in June 1979 and April 1980.

PEQUONNOCK RIVER

<u>Frequency</u> (%) (Years)	<u>Daniels Farm Road, Trumbull</u> (D.A. = 15.6 sq. mi.)	<u>Boston Avenue, Bridgeport</u> (D.A. = 25.2 sq. mi.)
10 10	1,800 cfs	2,400 cfs
2 50	4,200 cfs	6,000 cfs
1 100	6,000 cfs	8,600 cfs

5. PROBLEM DESCRIPTION

Water Supply

The Bridgeport Hydraulic Company (BHC) provides water to 13 communities in southwestern Connecticut, including Trumbull and Bridgeport. Their system of reservoirs and wells can supply a safe yield of 76 million gallons of water daily (mgd). The demand for water in the communities served by the BHC has decreased over the last couple of years from 65 mgd to under 60 mgd. This decrease is largely due to water conservation measures and recycling of industrial water. Presently, there is no need for additional water supply sources in southwestern Connecticut.

When the Trumbull Lake Project was authorized in 1966, it was estimated that water supply at Trumbull Lake would be required by the year 1980. Representatives of the BHC currently estimate that without the addition of new customers, water supply at Trumbull Lake will not be required until the year 2050. With new customers, it is possible that Trumbull Lake would be needed by the year 2010.

Flood Control

A meeting was held with Trumbull officials on 7 February 1984 to discuss flooding conditions along the Pequonnock River and inspect problem areas. Through hydrologic analysis of the Pequonnock River and coordination with Trumbull and Bridgeport officials, four flood prone areas were identified within the basin. These areas are shown on Enclosure 1 and are described in the following paragraphs.

Area I

Area I is located in Bridgeport and extends from about 500 feet downstream of Bunnells Pond Dam to Roosevelt Street Bridge (see Enclosure 2). The Pequonnock River is conveyed through most of this very flat reach in conduits extending beneath North Avenue and a large shopping complex. The lower portion of this reach is tidal.

Flood prone development within Area I includes 79 commercial properties and a condominium complex. Annual flood losses are estimated to equal \$374,000 in this area. If a flood similar in magnitude to the 1955 event (2 percent chance) were to occur under existing development conditions, approximately \$5.9 million in losses would result.

Area II

Area II is located in Trumbull about 900 feet upstream of Trumbull Road Bridge (see Enclosure 10). Flood prone development in this area is comprised of 17 single family homes, only 2 of which have first floors below the estimated 100-year flood level. Annual losses for this reach were estimated to equal \$13,900.

Area III

Area III is located in Trumbull just upstream of White Plains Road (see Enclosure 16). The Pequonnock River is very flat and has a wide flood plain through this reach, with many small interconnecting bodies of water. The level of these small ponds is governed by the level of the Pequonnock River, which fluctuates several feet with changes in riverflow.

The flood plain in this area contains a gas station and approximately 40 single family homes made up mostly of ranches with a few split entries, tri-levels and capes. About half of these homes would experience first floor flooding during the 100-year event. Total annual losses for Area III are estimated to equal \$43,300.

Area IV

Area IV is located in Trumbull just downstream of Daniels Farm Road Bridge (see Enclosure 21). The flood plain in this area contains a mix of 3 commercial and 20 residential properties. The 3 commercial properties are part of the shopping complex located along the west bank of the Pequonnock River. The residential properties are single family homes located along Manor Drive, Daniels Farm Road, and Pequonnock Road. Many of these homes are ranches with walk-out basements. Annual flood losses were estimated to equal \$56,800 in this reach.

SUMMARY OF ANNUAL FLOOD LOSSES

<u>Area</u>	<u>Estimated Annual Flood Losses</u>
I	\$374,000
II	13,900
III	43,300
IV	56,800
TOTAL	<u>\$488,000</u>

6. ALTERNATIVE PLANS CONSIDERED

During reconnaissance investigations several alternatives to reduce losses in flood prone areas of Trumbull and Bridgeport were considered. These alternatives include:

- a. Upstream Reservoir Storage
- b. Diversion of Flood Flows
- c. Channelization of Flood Flows
- d. Nonstructural Measures

A separate discussion of each alternative follows:

a. Upstream Reservoir Storage: The feasibility of constructing a multipurpose reservoir, referred to as Trumbull Lake, was investigated during earlier studies and found to lack economic justification under existing development conditions.

Studies conducted by the U.S. Department of Agriculture, Soil Conservation Service, in 1982 determined that the construction of a single-purpose flood control reservoir at the Trumbull Lake site lacked economic justification.

Another site considered for possible upstream storage is Bunnells Pond in Bridgeport. However, with a total storage capacity of only 700 acre-feet (equivalent to about 0.5 inches of runoff) this site does not have adequate capacity for effective flood control.

b. Diversion of Flood Flows: During reconnaissance studies the feasibility of constructing a deep rock tunnel to divert flood flows around Area I was investigated. The tunnel would extend about 2,000 feet from Bunnells Pond to Bridgeport Harbor. A 12-foot diameter tunnel with a 30-foot differential head would be required to provide about 2,000 cfs auxiliary capacity. The proposed tunnel would provide flood prone properties in Area I with approximately 100-year protection. This plan has an estimated first cost of over \$7 million and was determined to lack economic justification.

Because of the dense development in Bridgeport, an surface bypass conduit would not be practical or cost effective in this area. The cost to construct either a deep rock tunnel or overland bypass conduit to divert flood flows around flood prone Areas II, III and IV in Trumbull would far exceed expected benefits because of the limited flood losses in these areas.

c. Channelization of Flood Flows: Channel modifications were investigated in each of the four damage areas.

Area I

Channel modifications in this reach would consist of widening the opening at Roosevelt Street Bridge and the 800 feet of channel upstream of the bridge, widening the 500 feet of channel between North Avenue Bridge and the shopping center conduit, and constructing a 5-foot high dike along the west side of Glenwood Avenue between the North Avenue and Skating Rink Bridges (see Enclosures 2 through 9). The proposed channel would have a 60-foot bottom width. Concrete doublewalls would be constructed along disturbed areas of the riverbank to prevent erosion. This plan would provide flood prone properties in Area I with 50-year protection. This plan has an estimated first cost of \$4 million and is not economically justified. Additional flood protection would require costly modifications to the 800 feet of conduit that runs beneath the shopping center.

Area II

Channel modifications in this reach would involve widening and deepening 2,700 feet of channel just upstream of Trumbull Road (see Enclosures 10 through 15). The proposed channel would have a trapezoidal section with a 60-foot bottom width and 1 vertical on 2 horizontal side slopes. Stone protection would be provided along the riverbanks to prevent erosion. Proposed channel modifications would provide flood prone property in this area with approximately 100-year protection. This plan has an estimated first cost of \$1,250,000 and lacks economic justification.

Area III

Channel modifications in this reach would involve replacement of the Merritt Parkway and Brock Street Bridges and construction of 3,000 feet of dike along Twin Brooks Drive. This plan would also require the relocation of about 1,400 feet of Old Saw Mill Brook and the provision of upstream and downstream

drainage structures through the proposed dike (see Enclosures 16 through 20). Proposed channel modifications would provide flood prone structures in this area with approximately 100-year protection. This plan has an estimated first cost of \$2,250,000 and was determined to lack justification.

Area IV

Channel modifications in this reach would involve widening the opening at Daniels Farm Road Bridge and the 2,000 feet of channel just downstream of the bridge (see Enclosures 21 through 25). The proposed channel would have a 60-foot bottom width. Concrete doublewalls or stone protection would be placed along the riverbanks to prevent erosion. Proposed channel modifications would provide flood prone properties in this reach with 100-year protection. This plan has an estimated first cost of \$2.4 million and also lacks economic justification.

d. Nonstructural Measures: Nonstructural measures for Area I in Bridgeport were not considered practical because of the high depth of flooding and the large number of structures involved.

Nonstructural plans were developed for each of the flood prone areas in Trumbull. These plans involved the following nonstructural measures:

(1) Homes with first floor elevations less than 1-foot above the 100-year flood level would have their first floor and basement utilities raised to 1-foot above the 100-year flood level.

(2) Homes with first floors 1-foot or more above the 100-year flood level would have their basement utilities relocated to a first floor utility room addition.

(3) Commercial buildings would be floodproofed by the installation of temporary flood shields in doorway and window openings.

Area II

Nonstructural measures in this reach would consist of raising 2 homes and providing 15 others with utility room additions at an estimated first cost of \$800,000.

Area III

Nonstructural measures in this reach would consist of raising 24 homes and providing 15 others with utility room additions. This plan would also include floodproofing a gas station and relocating a home which has a very low first floor elevation and would not be practical to raise above the 100-year flood level. These nonstructural measures have a first cost of approximately \$2,900,000.

Area IV

Nonstructural measures in this reach would consist of raising 18 homes, providing 2 others with utility room additions and floodproofing 3 commercial buildings. This plan has an estimated first cost of \$1.5 million.

Nonstructural plans were designed to provide protection to all commercial and residential properties within the 100-year flood plain. However, none of these plans are economically justified. These findings concur with studies performed by the Corps of Engineers Hydrologic Engineering Center in Davis, California, which have shown that floodproofing measures are generally only feasible for structures that experience frequent first floor flooding (exceedance interval of 25 years or less). The majority of structures investigated during this study experience first floor flooding at the less frequent events (exceedance interval of 50 years or more).

The following table summarizes the economic feasibility of the various alternative plans investigated.

<u>SUMMARY OF ALTERNATIVES</u>				
(March 1985 Price Level, 8-3/8 Percent Interest Rate)				
<u>Plan</u>	<u>First Cost</u>	<u>Annual Cost</u>	<u>Annual Benefit</u>	<u>B/C Ratio</u>
RESERVOIR				
* Trumbull Lake (multipurpose)	\$24,125,000	\$2,424,000	\$1,620,000	0.67 to 1
**Trumbull Lake (single purpose)	15,582,700	1,345,600	364,656	0.27 to 1
Bunnells Pond	(Insufficient flood storage capacity)			
TUNNEL				
Area I	7,000,000	596,900	186,000	0.31 to 1
Areas II, III & IV	(not a viable alternative)			
CHANNEL MODIFICATIONS				
Area I	4,000,000	341,100	190,800	0.56 to 1
Area II	1,250,000	106,600	11,400	0.11 to 1
Area III	2,250,000	191,800	40,900	0.21 to 1
Area IV	2,400,000	204,600	41,700	0.20 to 1
NONSTRUCTURAL MEASURES				
Area I	(not a viable alternative)			
Area II	800,000	68,200	9,900	0.15 to 1
Area III	2,900,000	247,300	23,100	0.09 to 1
Area IV	1,500,000	127,900	48,700	0.38 to 1

* December 1982 Price Level

** From July 1982 Soil Conservation Service Report

7. CONCLUSIONS AND RECOMMENDATIONS

All of the flood damage reduction measures investigated during this study were determined to lack economic justification. Further study of flooding conditions along the Pequonnock River in Trumbull and Bridgeport, Connecticut is, therefore, unwarranted. Our findings concur with the results of a July 1982 study of flooding conditions along the Pequonnock River performed by the U.S. Department of Agriculture, Soil Conservation Service.

Options available to the town of Trumbull and city of Bridgeport to help reduce or mitigate flood losses along the Pequonnock River are flood insurance and limiting the use of flood prone basements to movable items. In addition, these communities and the State of Connecticut should consider the replacement of restrictive bridges, especially the Merritt Parkway Bridge, to help reduce backwater flooding.

The town of Trumbull has plans to enlarge Daniels Farm Road Bridge and seek assistance from the State to enlarge the Merritt Parkway Bridge.

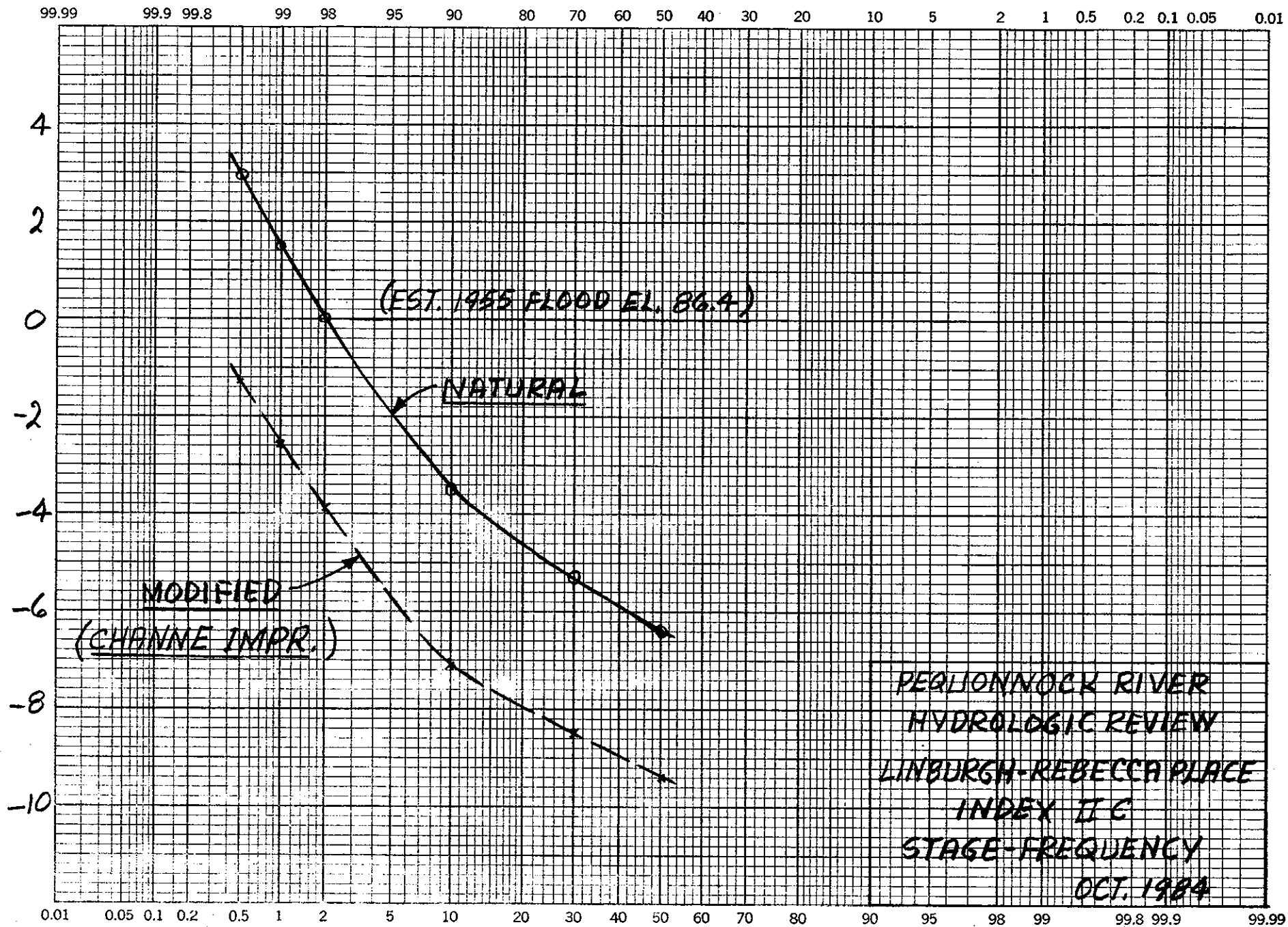
It is also recommended that the town of Trumbull and city of Bridgeport begin a channel maintenance program to remove any accumulation of debris along the Pequonnock River. These communities should also restrict any further encroachment on the river or development in the flood plain.

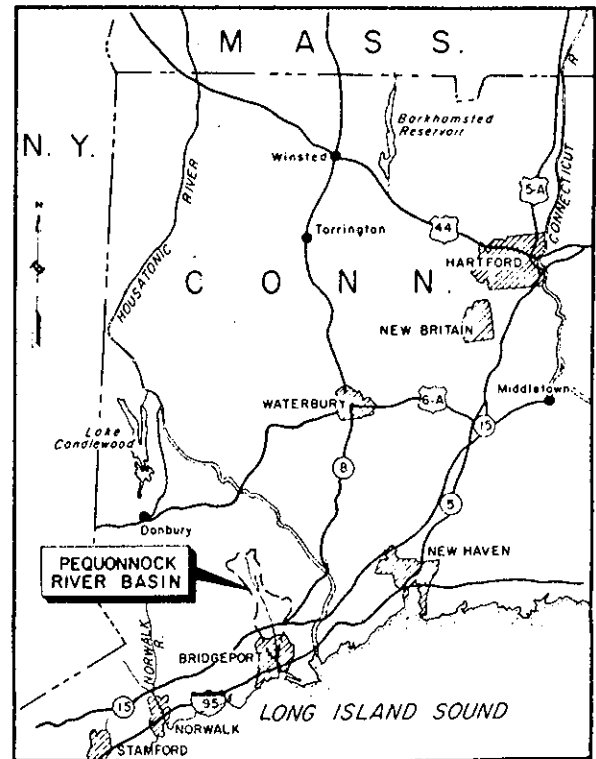
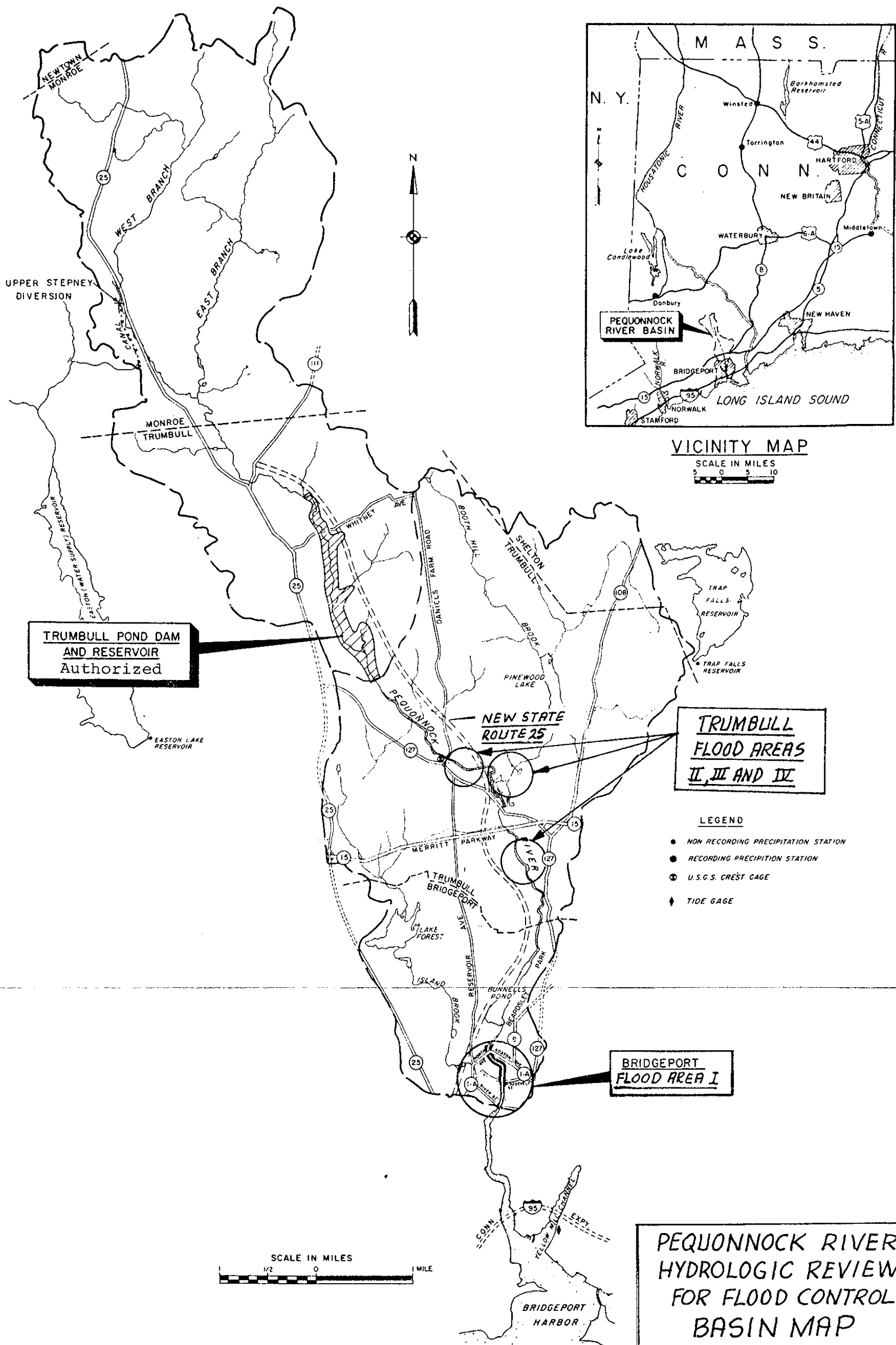
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CARL B. SCIPLE
Colonel, Corps of Engineers
Division Engineer

STAGE IN FT. RELATIVE TO EST. OCT. 1955 FLOOD LEVEL





**PEQUONNOCK RIVER
HYDROLOGIC REVIEW
FOR FLOOD CONTROL
BASIN MAP**

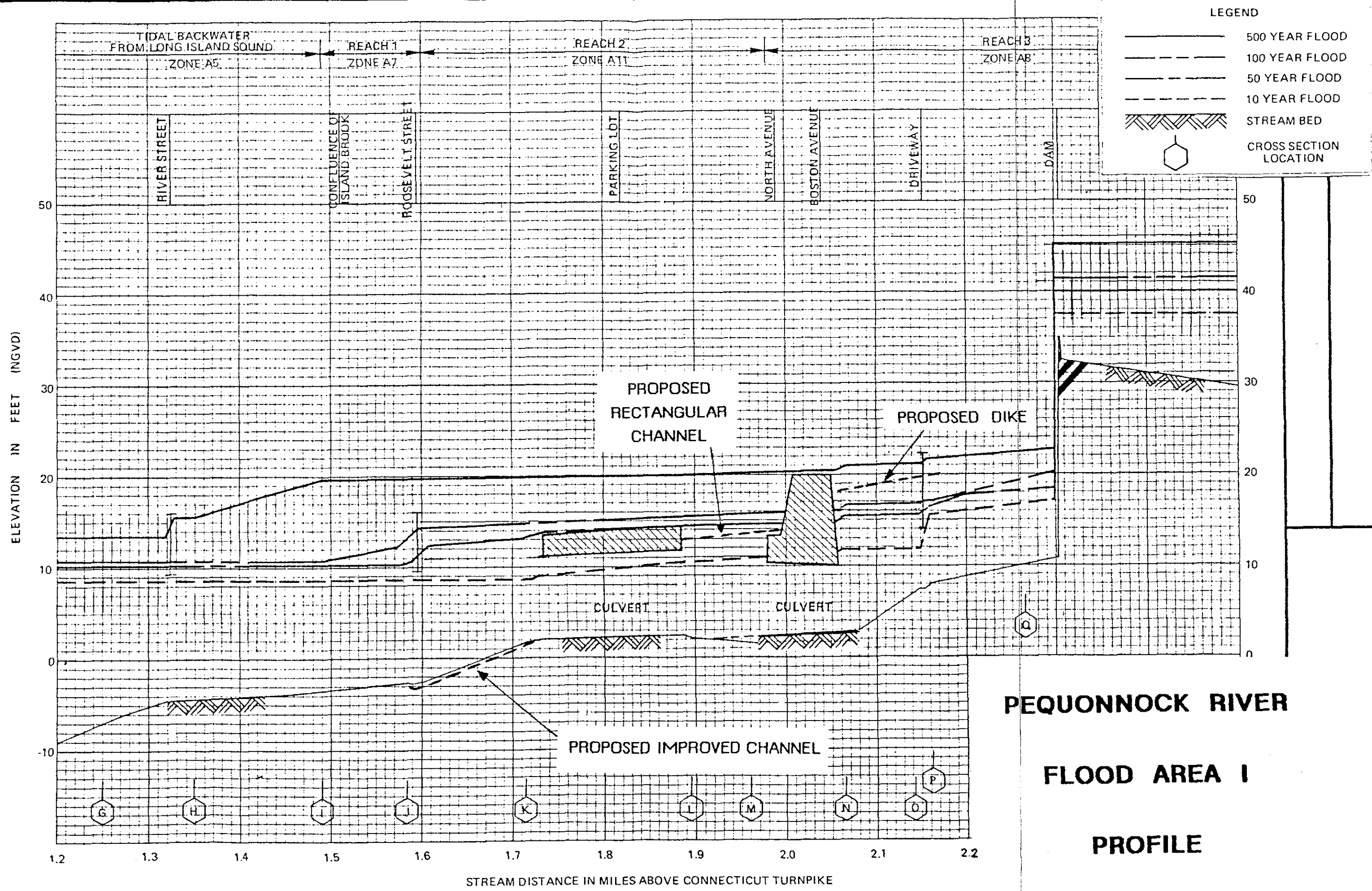
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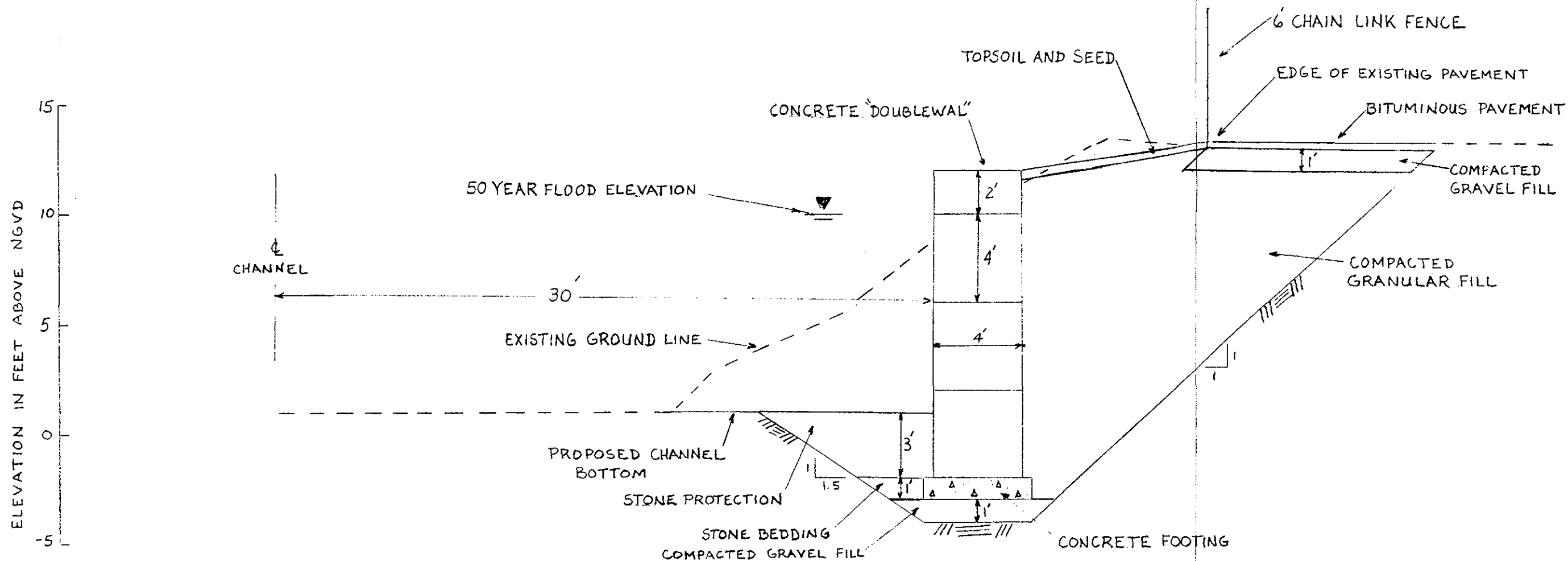


PEQUONNOCK RIVER
FLOOD AREA I
BRIDGEPORT, CT

JUNE 1985

ENCLOSURE 2



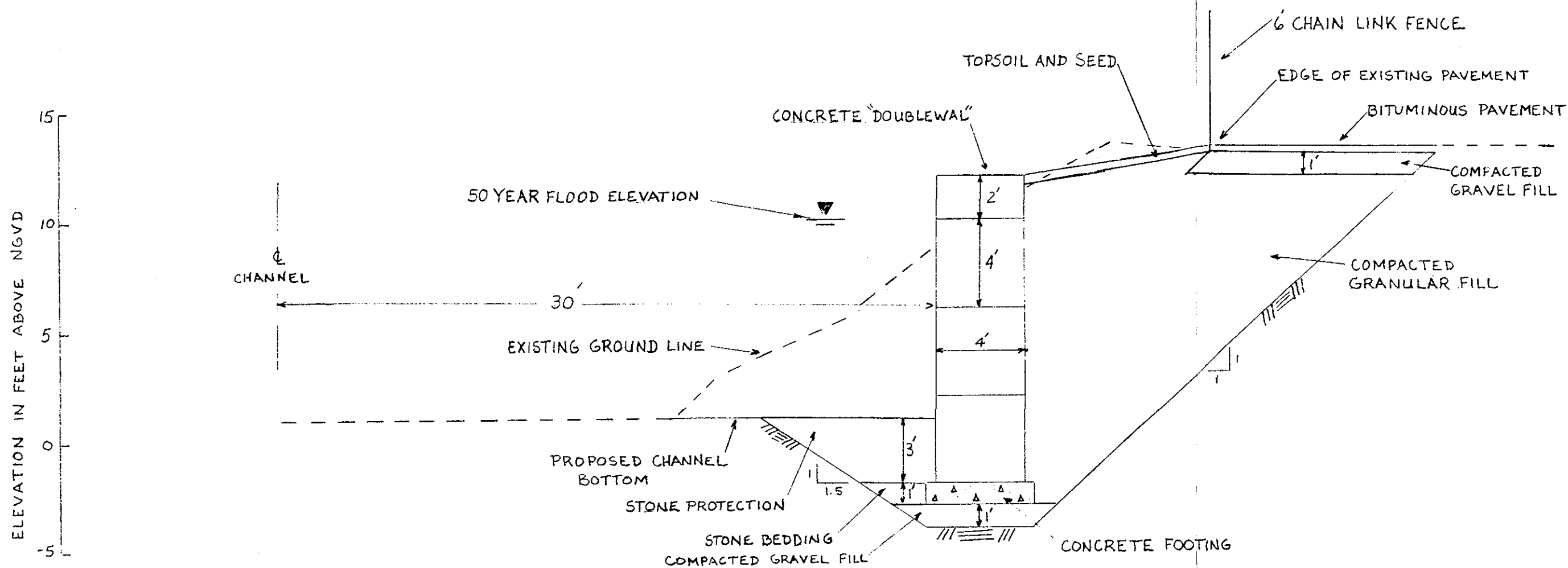


TYPICAL WALL SECTION
1800 LINEAL FEET

NOTES:

1. APPROXIMATELY 250 L.F. OF LATERAL SUPPORT WOULD BE REQUIRED TO PROTECT EXISTING STRUCTURES DURING CONSTRUCTION OF WALLS.
2. EXISTING SLOPES TO BE CLEARED AND GRUBBED PRIOR TO CONSTRUCTION.
3. AN "I" WALL WITH SHEET PILING PENETRATING TWICE THE WALL HEIGHT COULD BE SUBSTITUTED FOR THE CONCRETE "DOUBLEWAL".
4. APPROXIMATELY 900 L.F. OF PAVEMENT WOULD BE REQUIRED

DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS WALTHAM, MASS.	
MJO DES. BY	PEQUONNOCK RIVER TRUMBULL AND BRIDGEPORT, CT PROPOSED "DOUBLEWAL" AREA I A
MJO DR. BY	
QZM CK. BY	
GEOTECH. ENG. BR.	SCALE: 1" = 5'
SK. NO.	DATE: 1 APRIL 1985



TYPICAL WALL SECTION
1800 LINEAL FEET

NOTES:

1. APPROXIMATELY 250 LF OF LATERAL SUPPORT WOULD BE REQUIRED TO PROTECT EXISTING STRUCTURES DURING CONSTRUCTION OF WALLS
2. EXISTING SLOPES TO BE CLEARED AND GRUBBED PRIOR TO CONSTRUCTION.
3. AN "I" WALL WITH SHEET PILING PENETRATING TWICE THE WALL HEIGHT COULD BE SUBSTITUTED FOR THE CONCRETE "DOUBLEWAL".
4. APPROXIMATELY 900 LF OF PAVEMENT WOULD BE REQUIRED

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

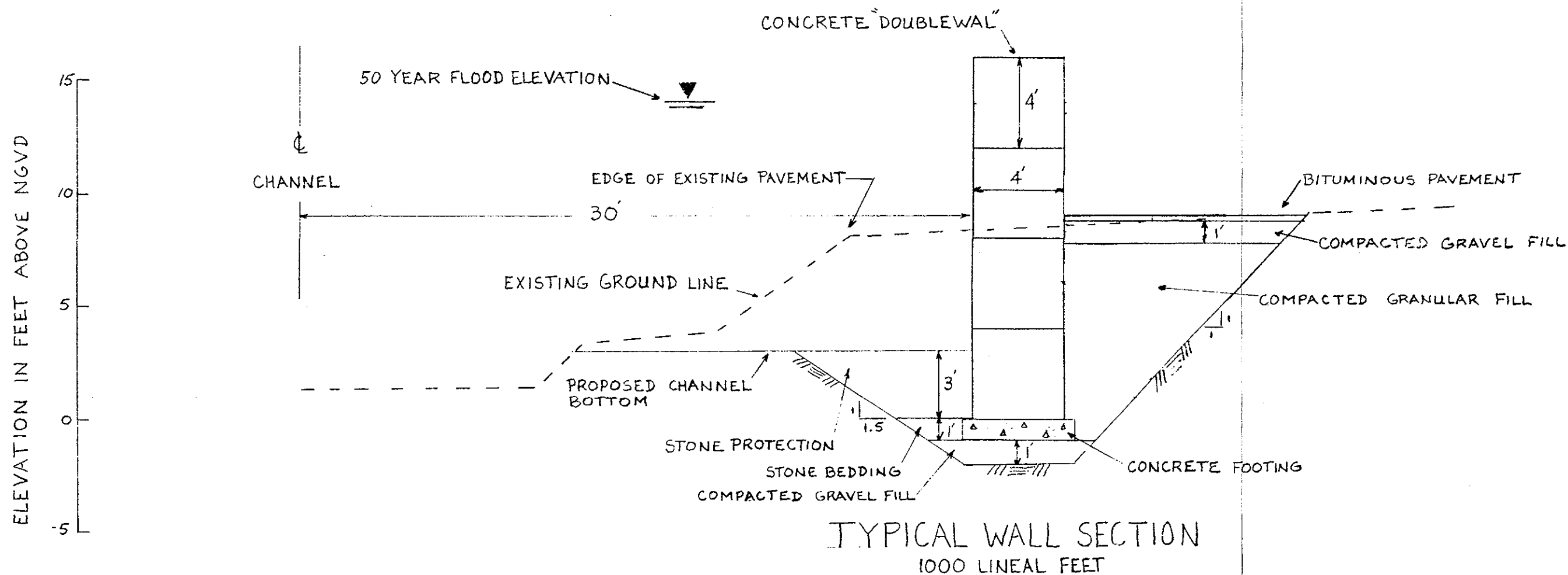
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CK. BY

PEQUONNOCK RIVER
TRUMBULL AND BRIDGEPORT, CT
PROPOSED "DOUBLEWAL"
AREA I A

GEOTECH. ENG. BR. SCALE: 1" = 5'
SK. NO. DATE: 1 APRIL 1985



NOTES:

1. CONSTRUCTION OF WALLS WOULD REQUIRE THE REMOVAL OF TWO STRUCTURES ALONG THE SOUTH BANK OR 200 LF OF LATERAL SUPPORT TO PROTECT EXISTING STRUCTURES DURING CONSTRUCTION AND SHARP ANGLE IN THE CHANNEL
2. AN "I" WALL WITH SHEET PILING PENETRATING TWICE THE WALL HEIGHT COULD BE SUBSTITUTED FOR THE CONCRETE "DOUBLEWAL".
3. EXISTING SLOPES TO BE CLEARED AND GRUBBED PRIOR TO CONSTRUCTION
4. "DOUBLEWAL" SHALL BE FILLED WITH IMPERMEABLE SOIL CEMENT MIXTURE

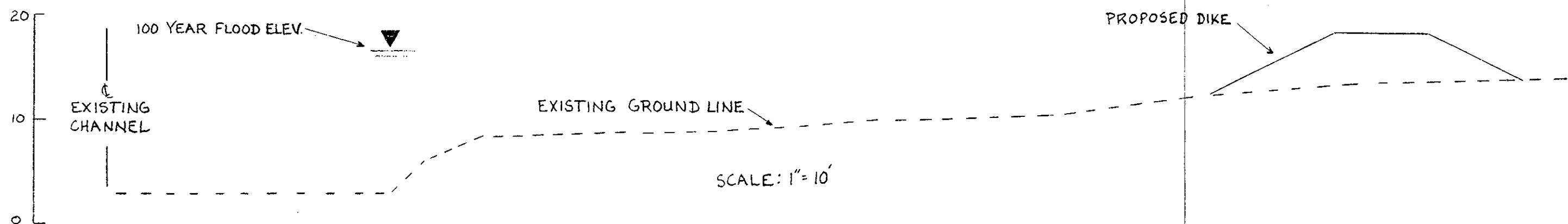
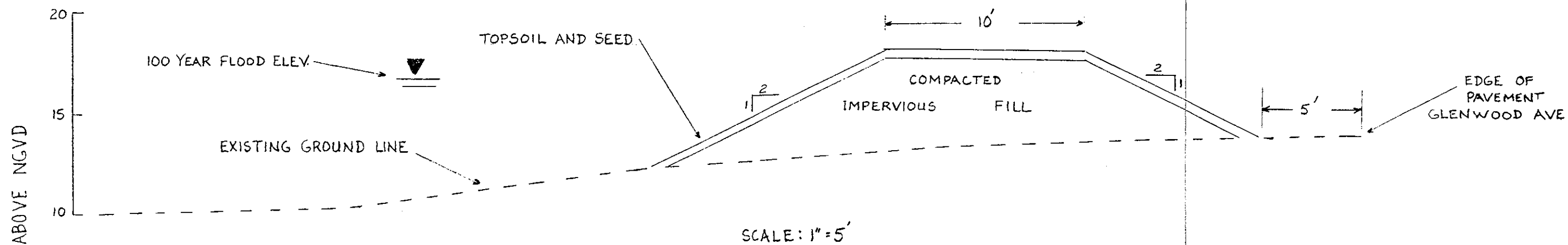
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

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CK. BY

PEQUONNOK RIVER
TRUMBULL AND BRIDGEPORT CT.
PROPOSED "DOUBLEWAL"
AREA 1 B

GEOTECH. ENG. BR.
SK. NO.

SCALE: 1" = 5'
DATE: 1 APRIL 1985



TYPICAL DIKE SECTION 800 LINEAL FEET

NOTES:

1. TOP ELEVATION OF DIKE VARIES FROM 18' TO 20' NGVD
2. EXISTING GROUND TO BE CLEARED AND GRUBBED PRIOR TO CONSTRUCTION OF DIKE.

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

MJD
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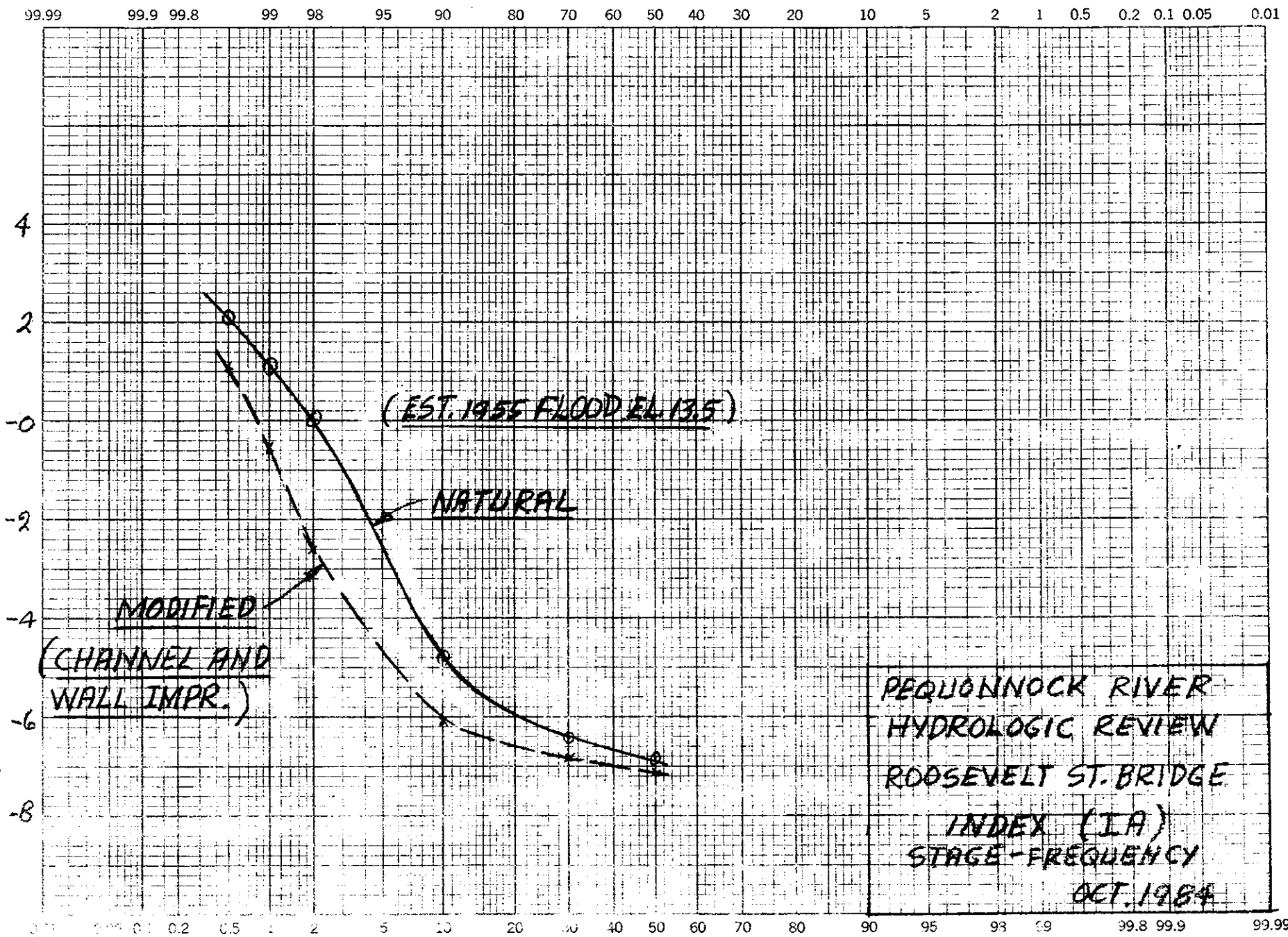
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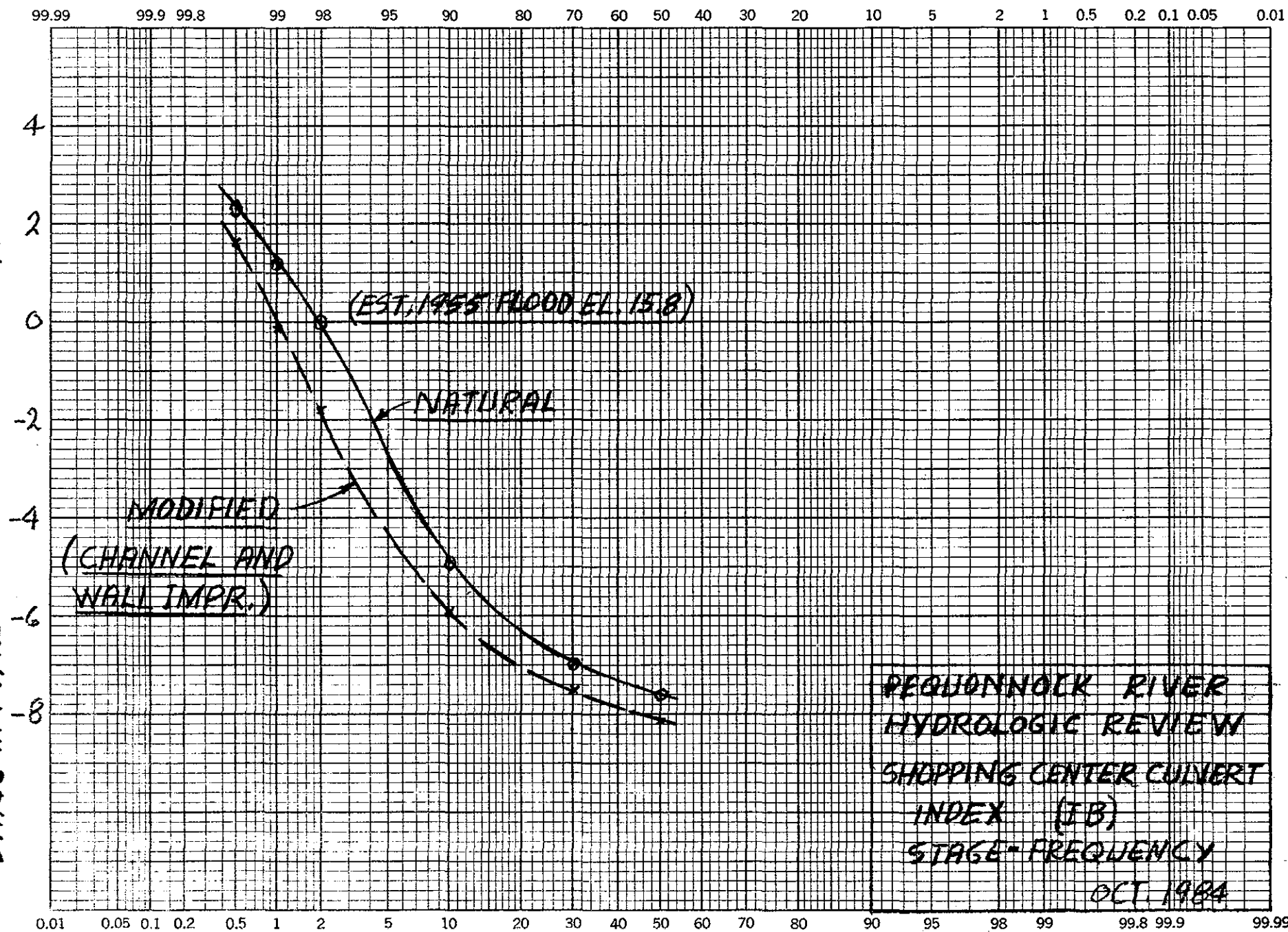
PEQUONNOK RIVER
TRUMBULL AND BRIDGEPORT, CT
PROPOSED DIKE SECTION
AREA I C

GEOTECH. ENG. BR. SCALE: AS SHOWN
SK. NO. DATE: 1 APRIL 1985

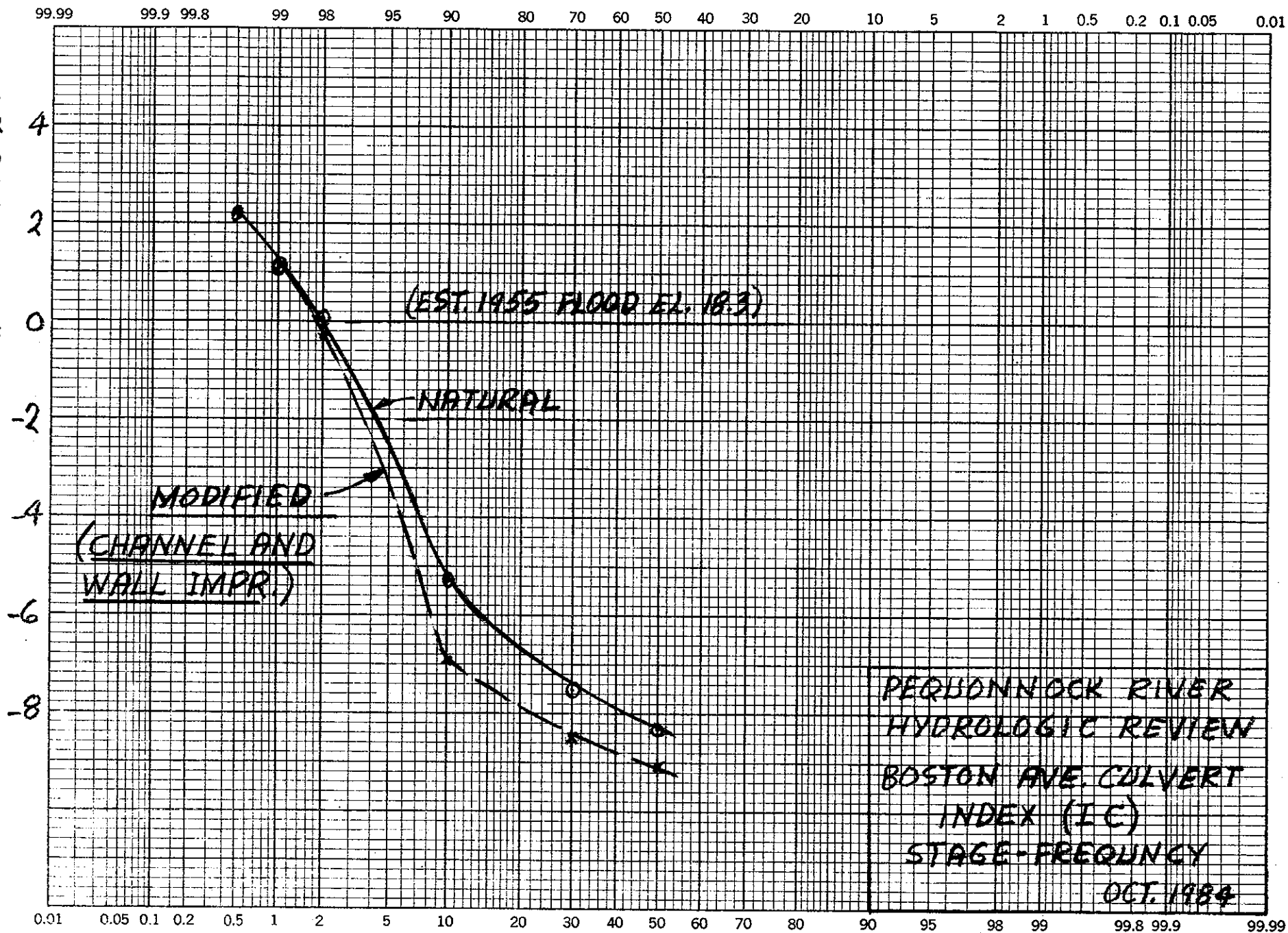
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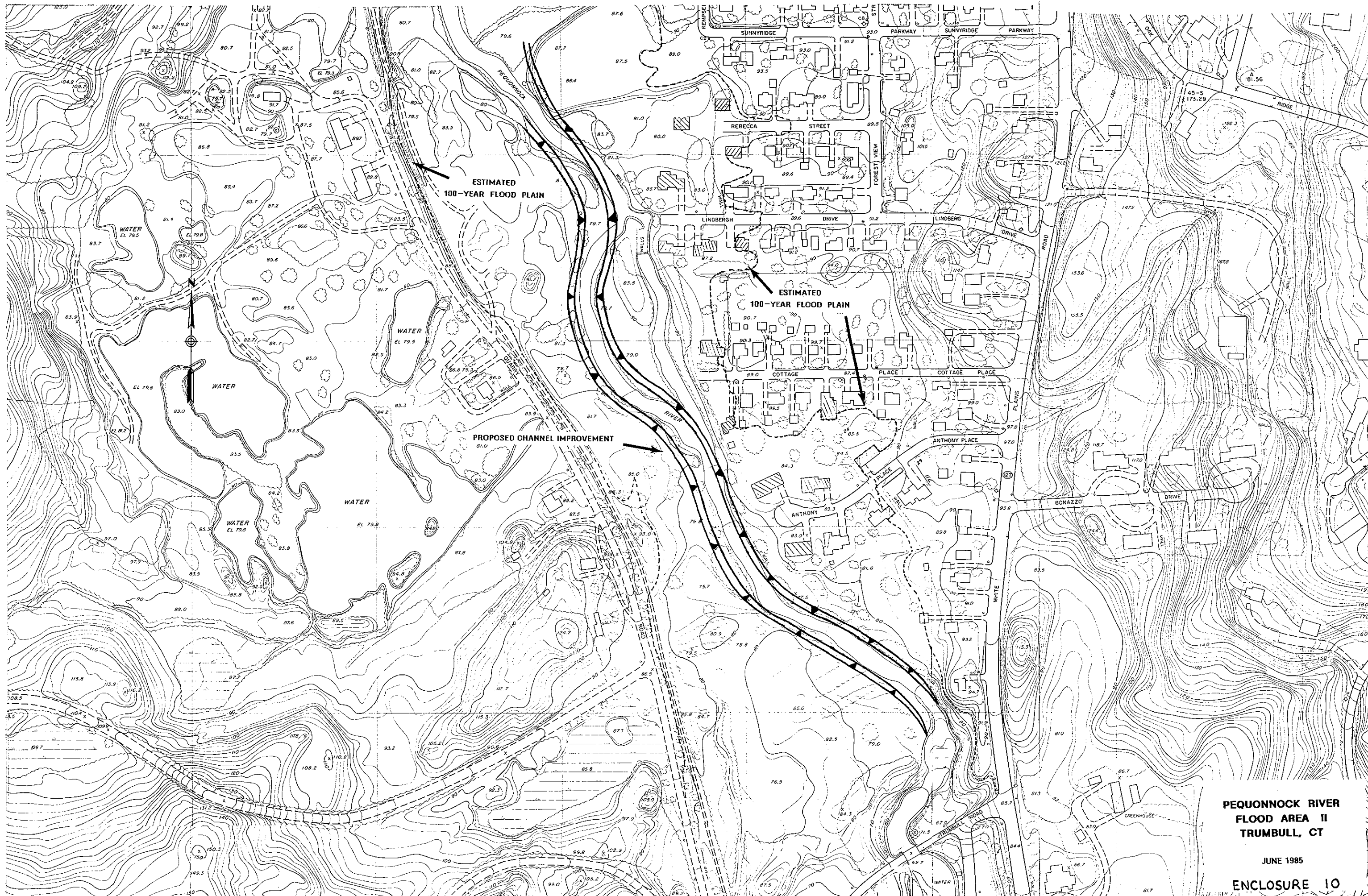


STAGE IN FT. RELATIVE TO EST. OCT. 1955 FLOOD LEVEL



STAGE IN FT. RELATIVE TO EST. OCT. 1955 FLOOD LEVEL

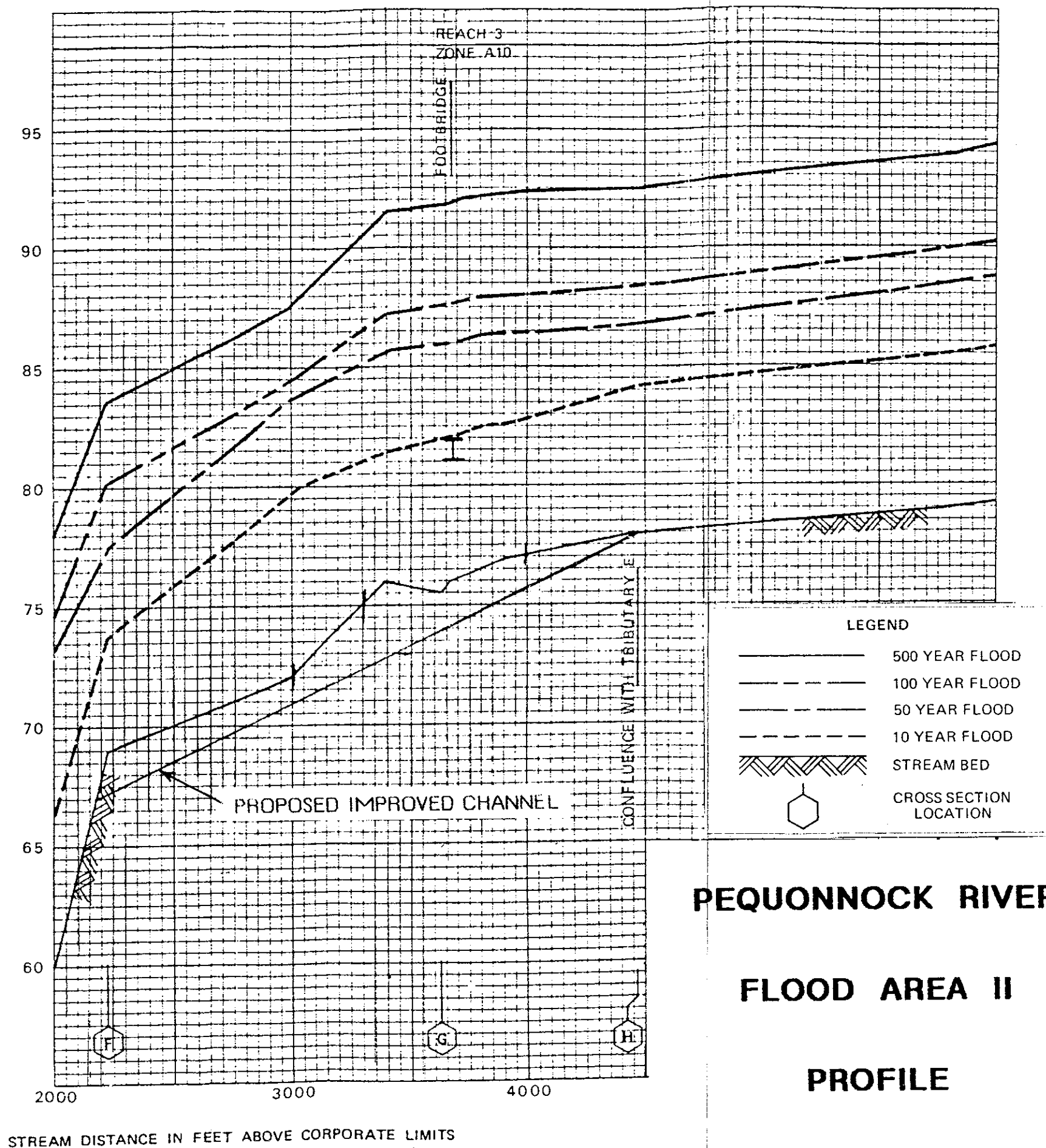
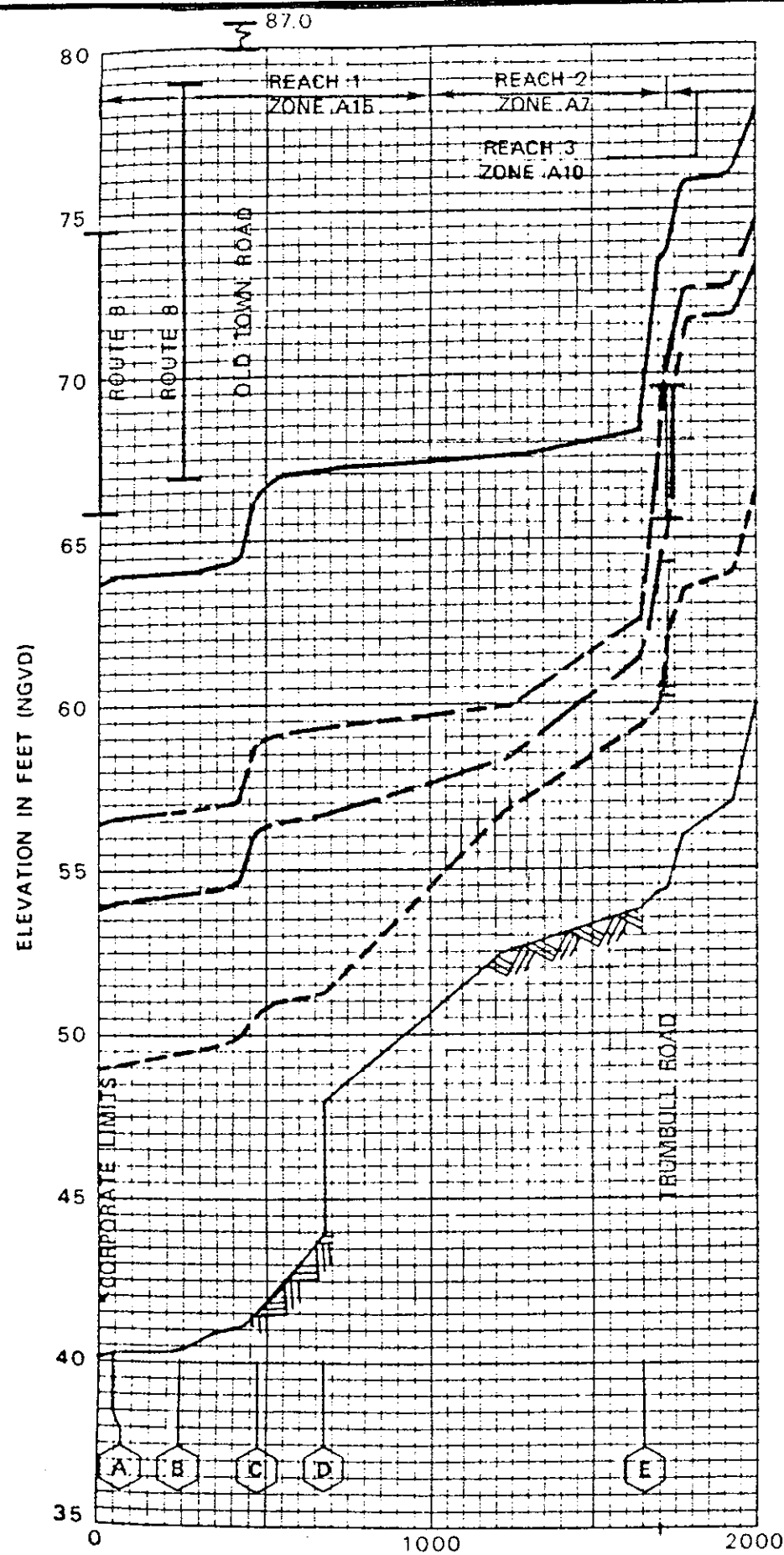


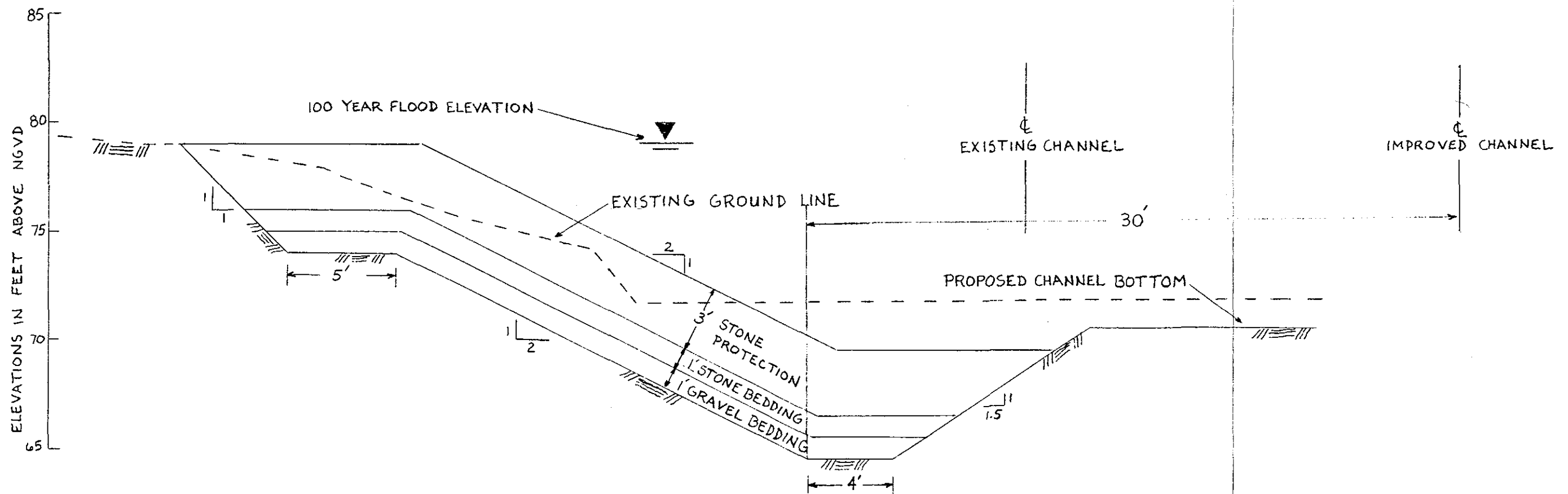


**PEQUONNOCK RIVER
FLOOD AREA II
TRUMBULL, CT**

JUNE 1985

ENCLOSURE 10





TYPICAL STONE PROTECTION SECTION

2300 LINEAL FEET

NOTES:

1. EXISTING SLOPES TO BE CLEARED AND GRUBBED PRIOR TO CONSTRUCTION.

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MJD
DR. BY
JFM
CK. BY

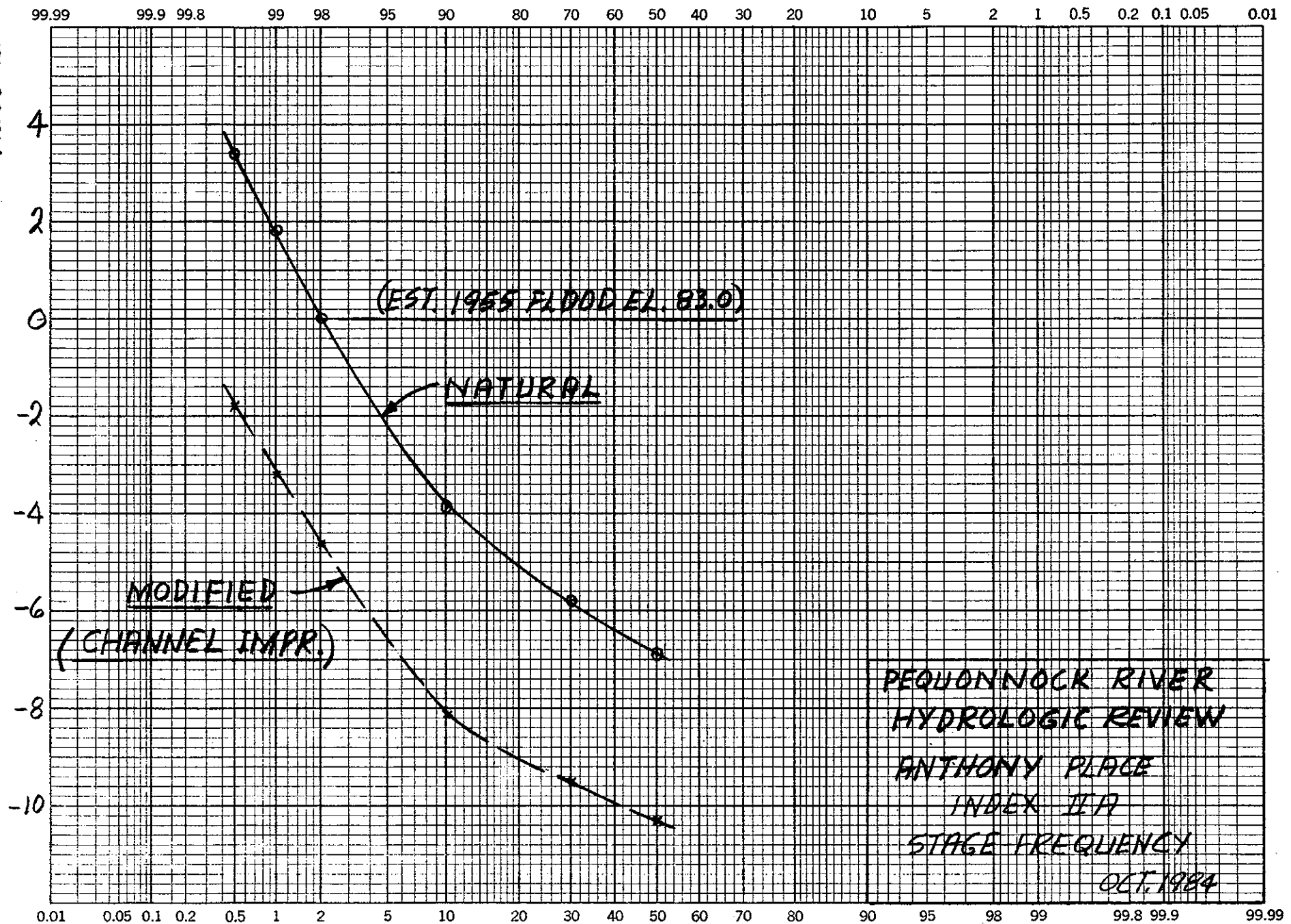
PEQUONNOK RIVER
TRUMBULL AND BRIDGEPORT, CT
PROPOSED STONE PROTECTION
AREA II

GEOTECH. ENG. BR.
SK. NO.

SCALE: 1" = 5'
DATE: 1 APRIL 1985

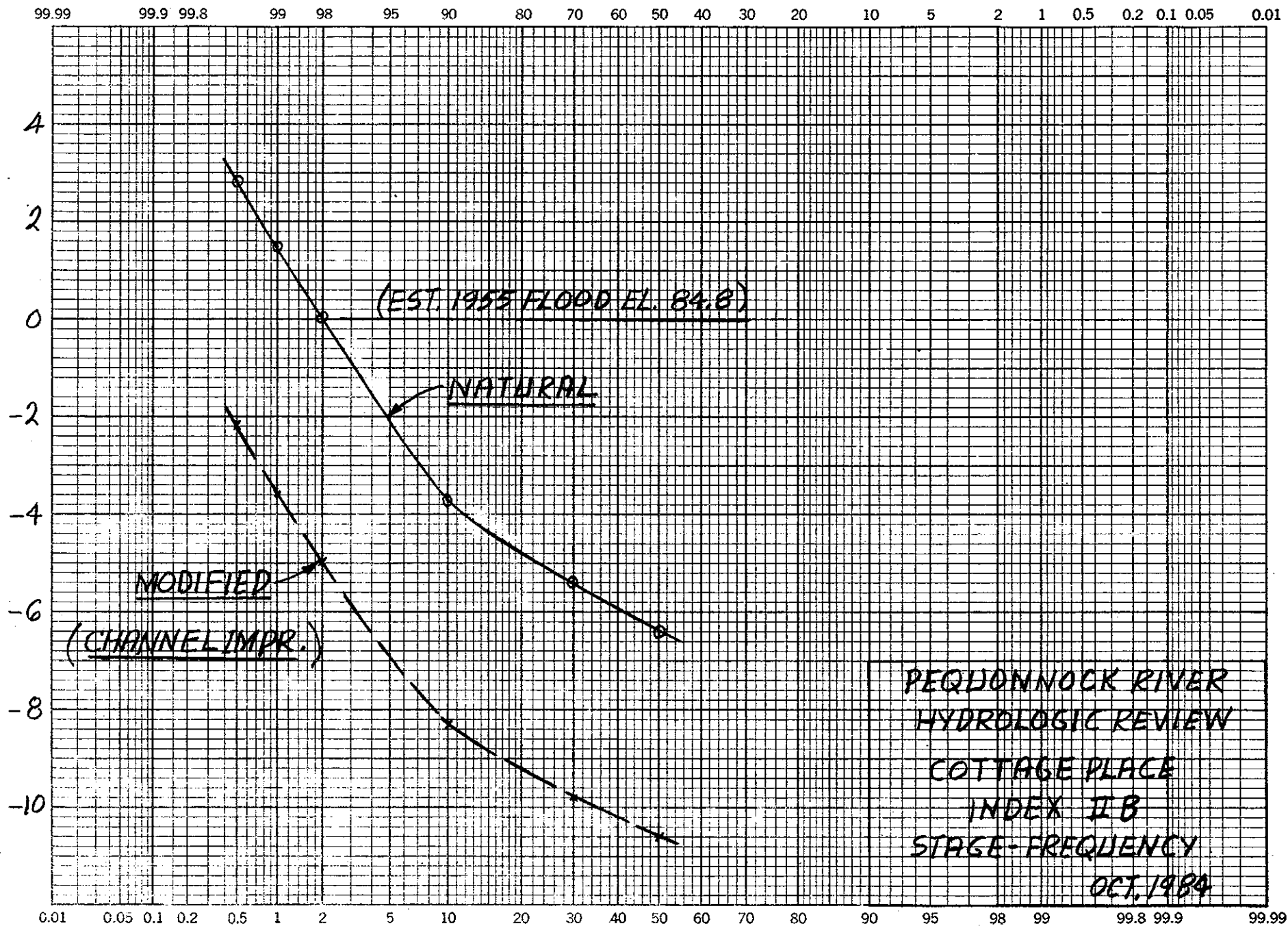
STAGE IN FEET RELATIVE TO EST. OCT. 1955 FLOOD LEVEL

ENCLOSURE 13

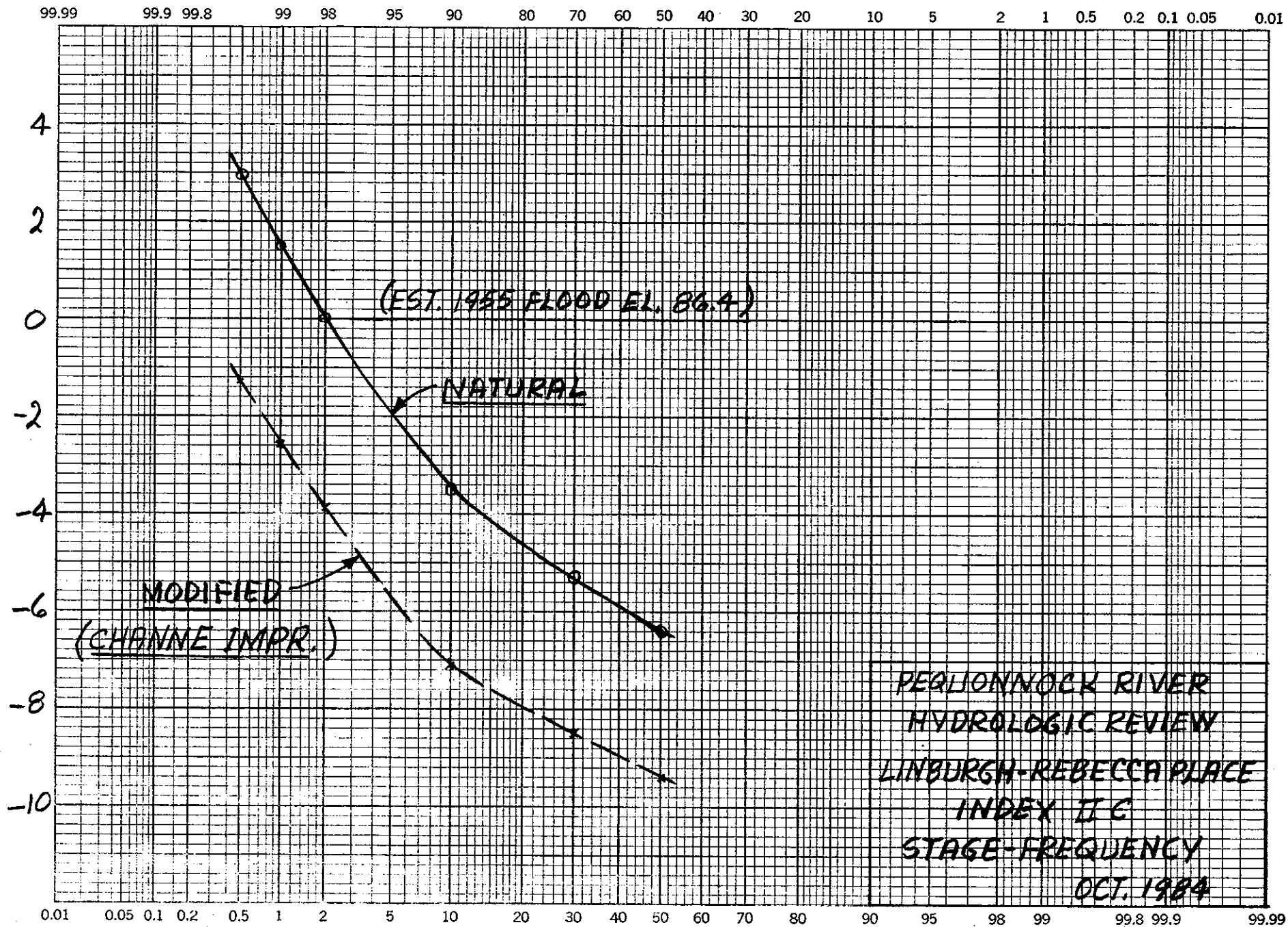


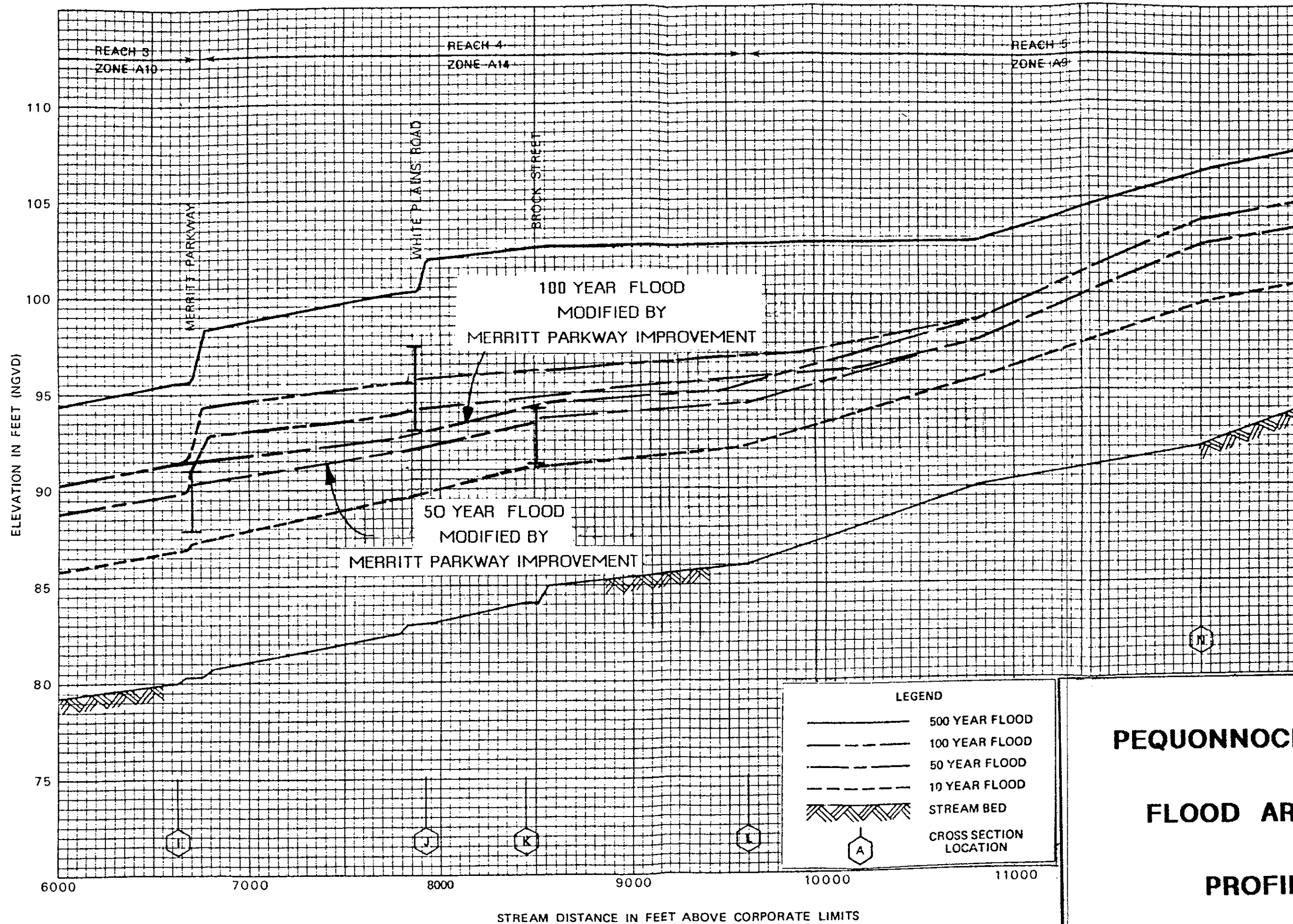
STAGE IN FT. RELATIVE TO EST. OCT. 1955 FLOOD LEVEL

ENCLOSURE 14



STAGE IN FT. RELATIVE TO EST. OCT. 1955 FLOOD LEVEL



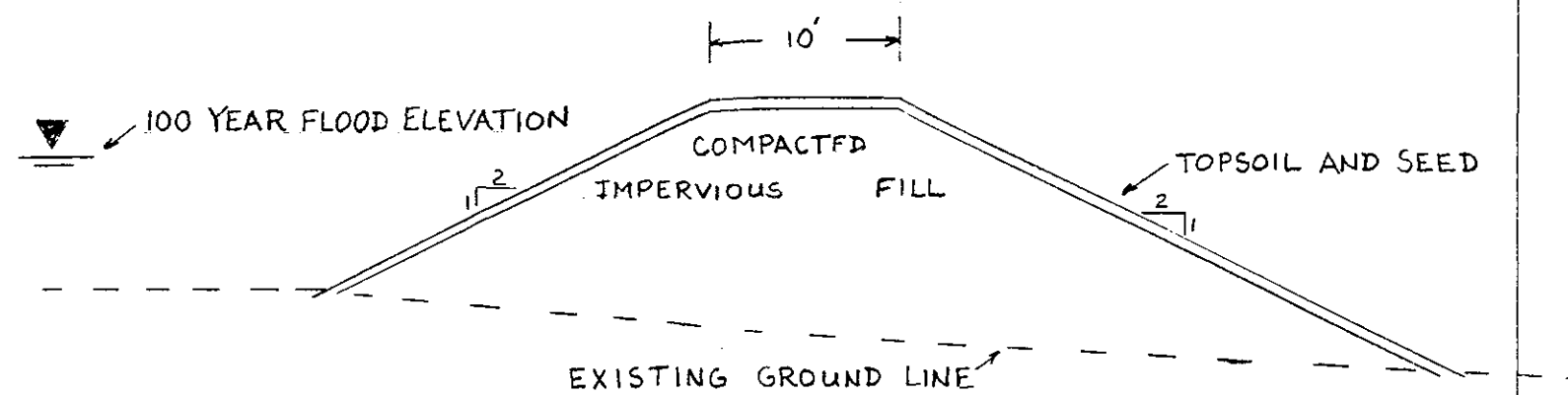


PEQUONNOCK RIVER

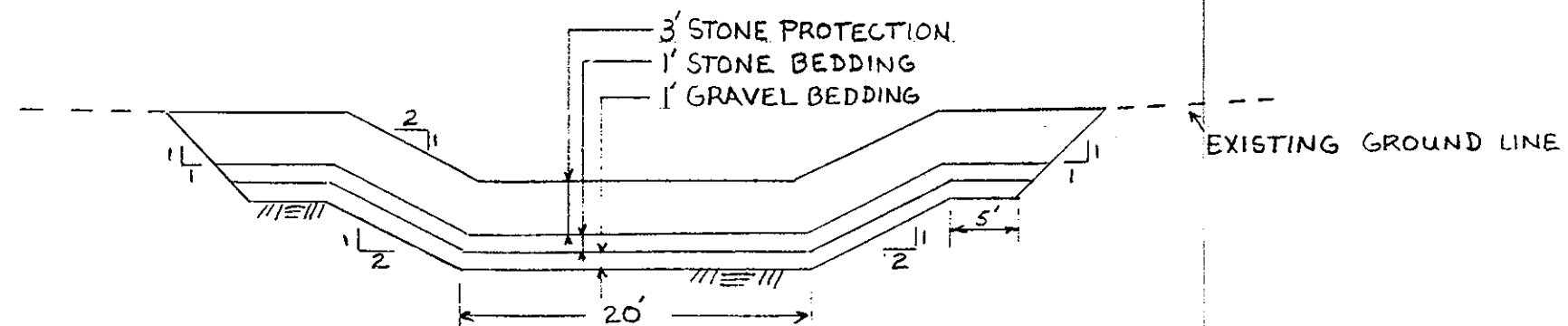
FLOOD AREA III

PROFILE

ELEVATION IN FEET ABOVE NGVD



TYPICAL DIKE SECTION
3000 LINEAL FEET



TYPICAL RELOCATED BROOK SECTION
1400 LINEAL FEET

NOTES:

1. TWO DRAINAGE STRUCTURES WOULD BE REQUIRED AT THE ENDS OF THE DIKE.
2. EXISTING GROUND TO BE CLEARED AND GRUBBED PRIOR TO CONSTRUCTION OF DIKE.

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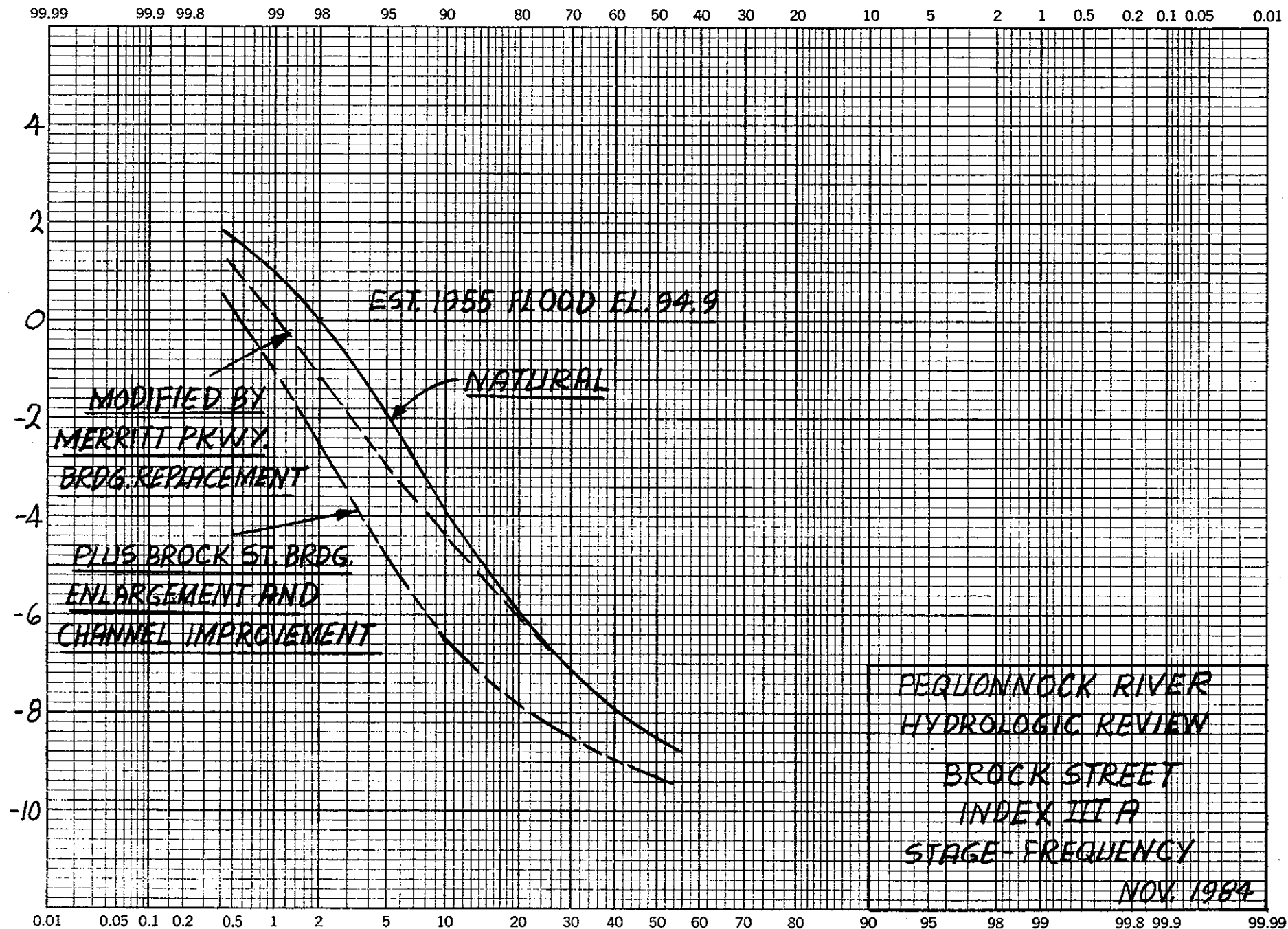
PEQUONNOCK RIVER
TRUMBULL AND BRIDGEPORT, CT.
PROPOSED DIKE AND
BROOK RELOCATION
AREA III

GEOTECH. ENG. BR.
SK. NO.

SCALE: 1" = 10'
DATE: 2 APRIL 1985

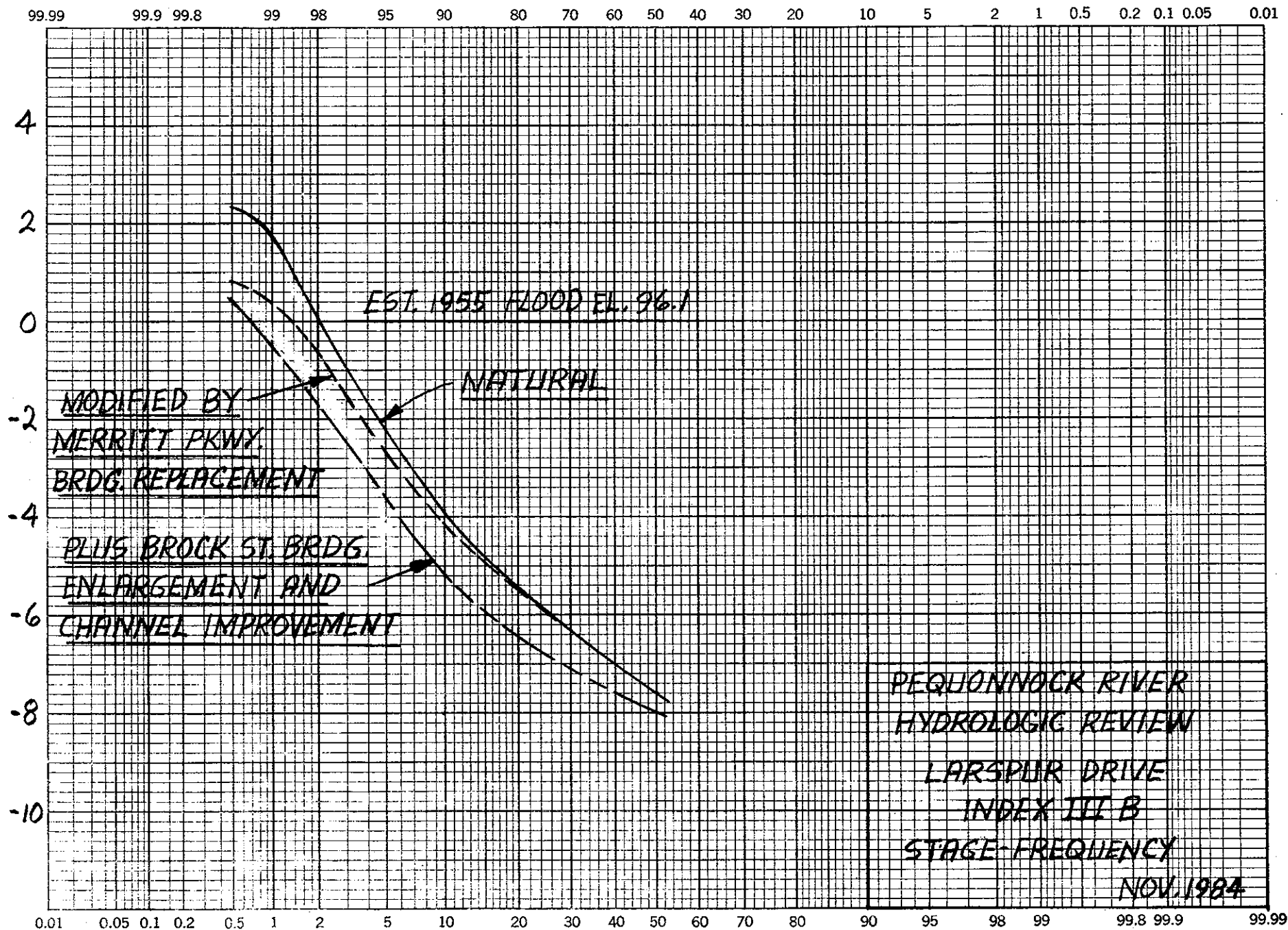
STAGE IN FT. RELATIVE TO OCT. 1955 FLOOD

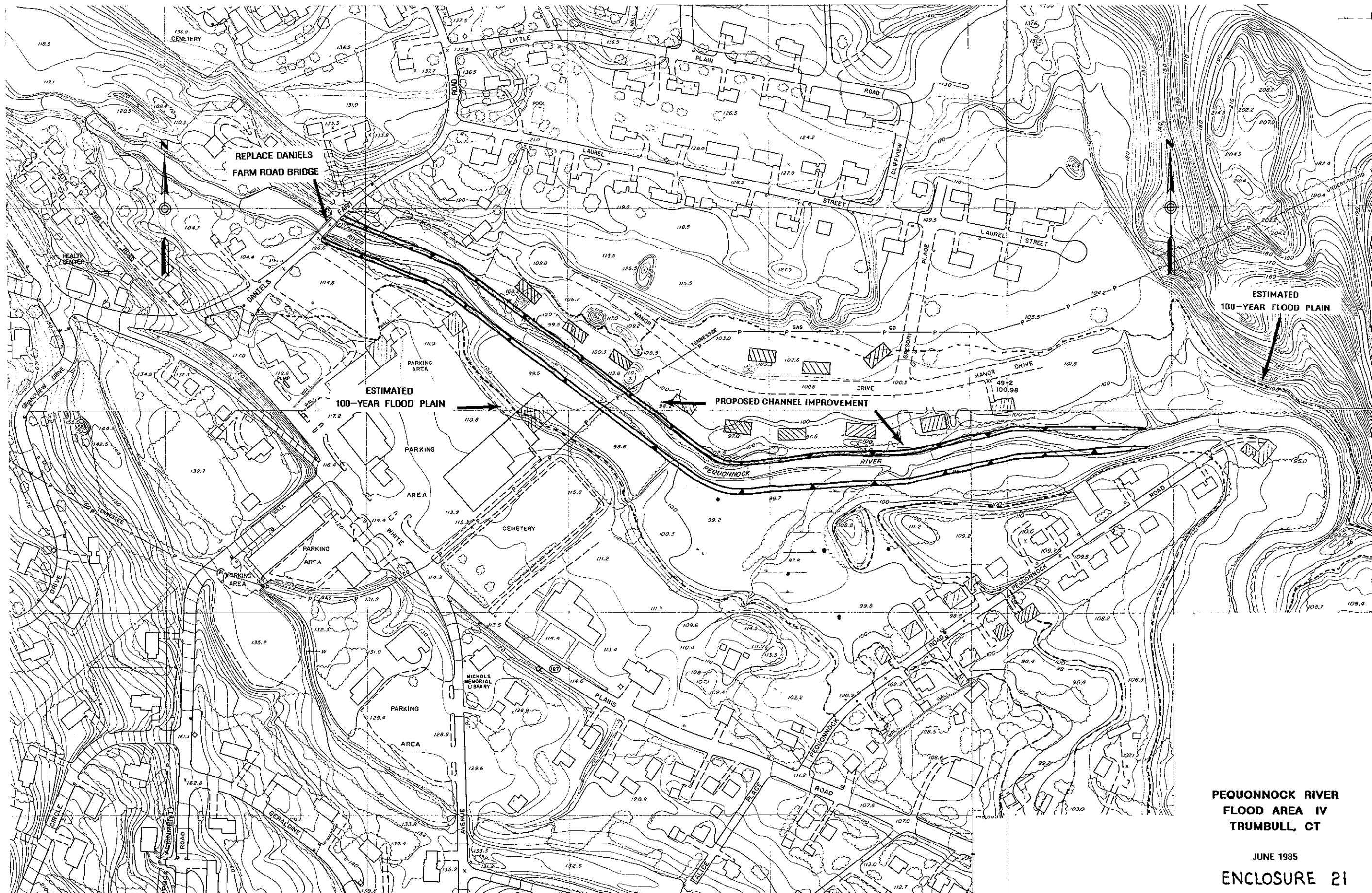
ENCLOSURE 19



STAGE IN FT. RELATIVE TO OCT. 1955 FLOOD

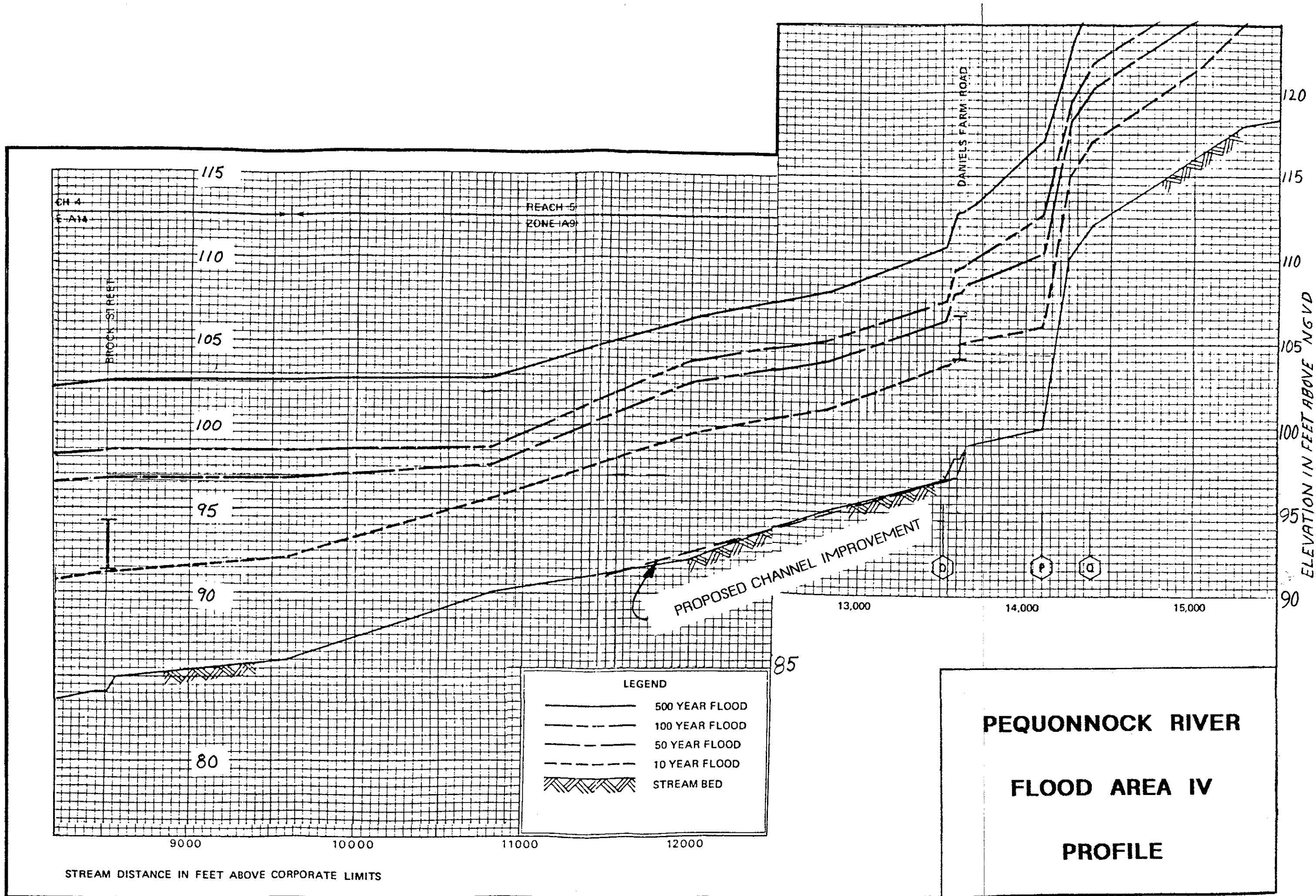
ENCLOSURE 20

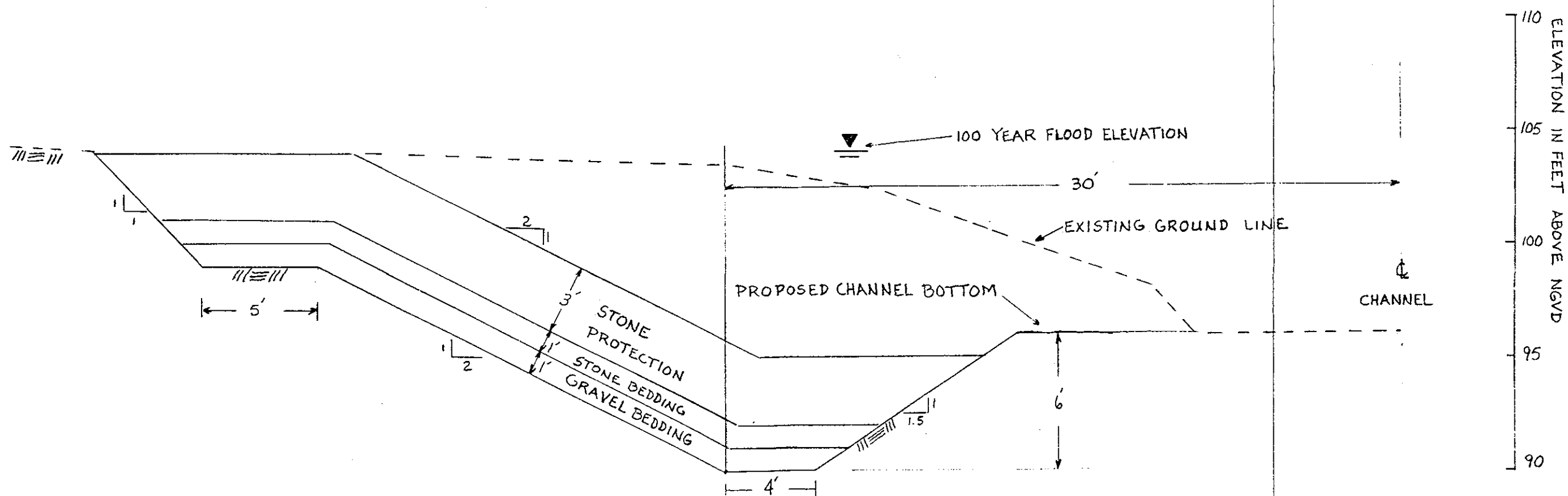




PEQUONNOCK RIVER
FLOOD AREA IV
TRUMBULL, CT

JUNE 1985
ENCLOSURE 21





TYPICAL STONE PROTECTION SECTION
1200 LINEAL FEET

NOTES:

1. EXISTING SLOPES TO BE CLEARED AND GRUBBED PRIOR TO CONSTRUCTION.
2. THREE DRAINAGE PIPES ENTER RIVER FROM EAST BANK

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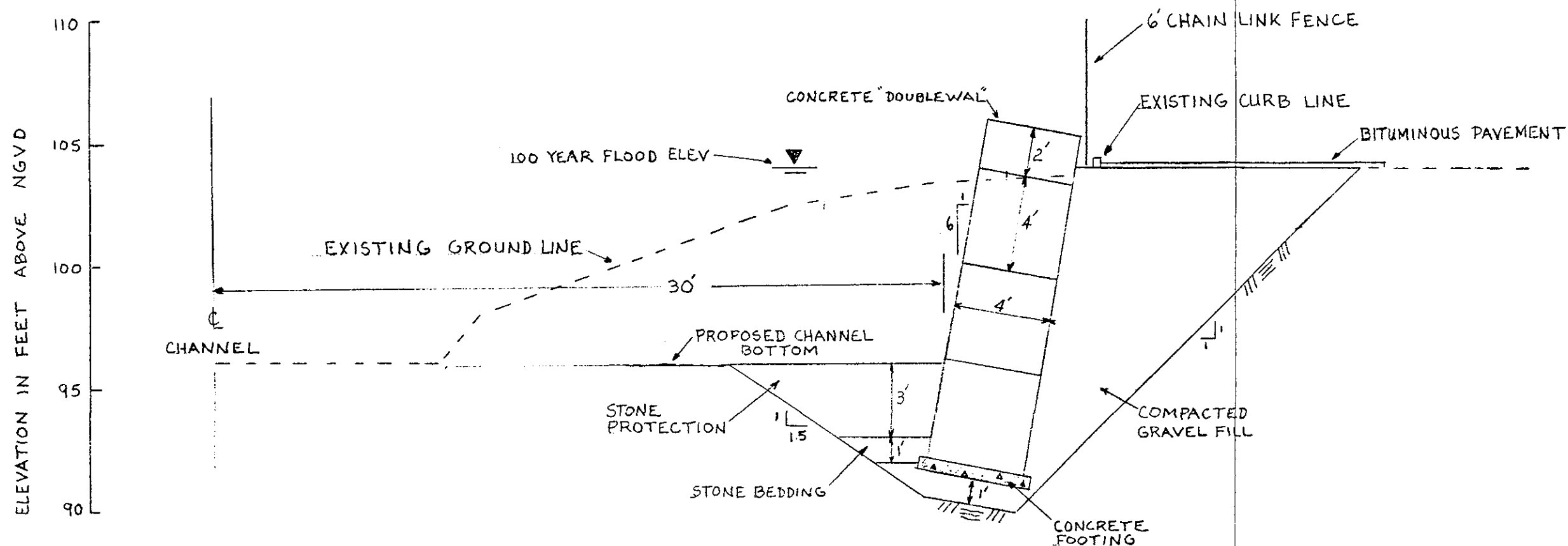
MTD
DR. BY

gsm
CK. BY

PEQUONNOCK RIVER
TRUMBULL AND BRIDGEPORT CT.
PROPOSED STONE PROTECTION
AREA IV

GEOTECH. ENG. BR.
SK. NO.

SCALE: 1"=5'
DATE: 29 MARCH 1985



TYPICAL WALL SECTION
1600 LINEAL FEET

NOTES:

1. CONSTRUCTION OF WALLS WOULD REQUIRE REMOVAL OF ALL TREES WITHIN 30 FEET OF THE EXISTING BANKS BETWEEN DANIELS FARM ROAD BRIDGE AND A POINT 800 FEET SOUTH
2. A LATERAL DRAINAGE PIPE RUNS ALONG THE TOP OF THE WEST BANK. CONSTRUCTION OF THE WEST BANK WALL (800 L.F.) WOULD REQUIRE RELOCATION OF THE PIPE, SUPPORT OF THE PIPE DURING CONSTRUCTION OR PERFORMING THE WORK IN SHORT ZONES TO PROTECT THE PIPE.
3. AN "I" WALL WITH SHEET PILING PENETRATING TWICE THE WALL HEIGHT COULD BE SUBSTITUTED FOR THE CONCRETE "DOUBLEWALL".
4. EXISTING SLOPES TO BE CLEARED AND GRUBBED PRIOR TO CONSTRUCTION.
5. THREE DRAINAGE PIPES ENTER RIVER FROM WEST BANK.

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PEQUONNOCK RIVER
TRUMBULL AND BRIDGEPORT, CT.

PROPOSED "DOUBLEWALL"
AREA IV

GEOTECH. ENG. BR.
SK. NO.

SCALE: 1" = 5'
DATE: 29 MARCH 1985

STAGE IN FT. RELATIVE TO OCT. 1955 FLOOD LEVEL

ENCLOSURE 25

